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AUTHOR Wellisch, Jean B.; And Others
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ABSTRACT

School programs and contextual characteristics that differentiate between successful and nonsuccessful elementary schools funded under the Emergency School Aid Act (ESAA) are examined in this study. It was designed to build upon some of the tentative findings of the 1974-1975 indepth study, in which a number of program and contextual components were found to be related to academic achievement in the ESAA schools. The research strategy of the 1975-76 study was hypothesis testing. The factors studied in this study include: (1) organizational climate of schools including administrative leadership in instruction, program coordination, and academic standards, (2) reading and mathematics instructional practices including structured teaching methods and the relationship between structured teaching, student task oriented behavior, and achievement gain, (3) resource use and resource costs including the level of resource use and the quality of resource use, and (4) equality of educational opportunity. Some of the findings from the 1974-75 study were confirmed, most notably, the finding concerning the importance of administrative leadership. However, not all of the 1974-75 findings were confirmed. (Author/AM)

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AN IN-DEPTH STUDY OF EMERGENCY SCHOOL AID ACT (ESAA) SCHOOLS: 1975-1976

Jean B. Wellisch
Ronald A. Carriere
Anne H. MacQueen
Gary A. Duck

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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PROJECT OFFICER, PROJECT PERSONNEL, AND SUBCONTRACTORS

Project Director

John E. Coulson
Diana D. Dingler, Secretary

Planning and Control

Thomas F. Collins, Senior Control Officer
Marilyn Stevenson, Staff Administrator
Susan E. Shehtanian, Secretary

Operations

Raymond B. Stewart, Manager
Jean B. Wellisch, Special Studies Coordinator
Dean R. Lee, Data Collection Coordinator
Emily H. Allison
Ronald A. Carriere
Anne H. MacQueen
Marilyn P. Ridley, Secretary
Catherine Maurer, Secretary

Analysis

Dan G. Ozenne, Manager
Raymond W. Baker
Clarence Bradford
Deborah Brown
William J. Doherty
Gary A. Duck
Sally D. Hanes
Judith A. Hemenway
Michael Hirsch
Eric Nelson-Lund
Maron Jones, Secretary

Documentation

Kean A. Mantius
Patricia E. Cowdery
Una Vere Katter
Marcia Simonson, Repro Typist

Project Officer, U.S. Office of Education

David Shoemaker (succeeded M. J. Wargo in 1976)

Consultant

Harold Nichols

Subcontractor

American College Testing Program

ESAA Evaluation National Advisory Panel

Louis Alvarez
Boyd Bosma
William Coffman
Nancy S. Cole
Silas Craft
Jess Elliott
Edgar Epps
Seymour Feshbach
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Janette Hatch
James Hoyt
Ward Keesling, Consultant
Alfred Marcus
Ralph Melaragno
Patrice Metro
Thomas Ramirez
Hunter Temple, Consultant
Nancy Van Gelder

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OVERVIEW

As part of the evaluation of the Emergency School Aid Act (ESAA), a sample of elementary schools was studied in depth in 1974-75 and another sample in 1975-76. Results of the 1974-75 in-depth study were presented in an earlier report.* In this document, we present results of the second (1975-76) in-depth study of ESAA schools.

The Emergency School Aid Act was enacted into law in June, 1972, to provide elementary and secondary schools with financial assistance to (1) meet the special needs incident to the elimination of minority segregation and discrimination; (2) encourage the voluntary reduction, elimination, or prevention of minority-group isolation; and (3) aid students in overcoming the educational disadvantages of minority-group isolation.

Under contracts from the U.S. Office of Education, System Development Corporation conducted a three-year evaluation of two closely related programs authorized under ESAA--the Basic Grants program and the Pilot Grants program. The national evaluation of the Basic and Pilot programs was designed to determine the cumulative impact of the Act's objectives over a period of three years. During the second and third years of the ESAA evaluation, samples of elementary schools were studied in depth for the purpose of identifying and describing school program and contextual components that differentially affected school success in raising the reading and math achievement of students.

Both years of the in-depth study focused upon five areas: organizational climate within the school, reading and math instructional practices, resources used in reading and math, school and teacher practices related to providing equality of educational opportunity for minority and non-minority students,

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*Wellisch, J. B., Marcus, A. C., MacQueen, A. H., Duck, G. A., An In-Depth Study of Emergency School Aid Act (ESAA) Schools: 1974-1975, Santa Monica, California: System Development Corporation, 1976.

and parent and community involvement in the school. In the first in-depth study, we examined relationships between school success and an extensive pool of program and contextual variables that comprised these areas. From these relationships several promising construct areas were identified, each defined by variables that had strong relationships to school success. However, in extensive search strategies where the relationships of many variables are examined, it is probable that some of the associations found will be chance occurrences. For that reason, the second in-depth study, reported here, concentrated upon verifying and explicating the results of the earlier study.

The remainder of this overview summarizes the key findings of the 1975-76 ESAA in-depth study and discusses the extent to which results of the earlier study were confirmed. One area that was investigated--parent and community involvement with the school--is not reported, since results of the previous study were not confirmed and no new findings showed a relationship to student achievement.

ORGANIZATIONAL CLIMATE

In-depth schools that succeeded in raising student achievement were characterized in 1975-76 by administrative leadership in instruction, confirming the major school organization finding of the 1974-75 in-depth study. Effective administrators felt strongly about instruction and assumed relatively more responsibility for instruction-related tasks such as selecting basic instructional materials and planning and evaluating programs for the entire school. These leadership qualities were recognized and reported by teachers, which no doubt reflects the fact that effective administrators also communicated their views concerning instruction to teachers. One means of communicating, especially prevalent in successful schools, was regular review and discussion with teachers about their classroom performance. Communication may also have served to coordinate instructional programs throughout the school, as we found that extensively coordinated programs were more common in successful schools than in nonsuccessful ones. Finally, we found that administrators in successful schools emphasized academic standards by reviewing teaching performance, by opposing

the postponement of instruction in basic skills, and by requiring low-achieving students to repeat grades.

READING AND MATH INSTRUCTIONAL PRACTICES

Based upon results of the 1974-75 study, in the present study we expected to find a simple, direct relationship between teachers' use of structured instructional methods and student gain. We anticipated that various structured teaching approaches would be positively related to each other and to reading and mathematics gain.

In general, the results of the previous study were confirmed; however, the relationships between teacher behavior and student achievement gain were more complex than we had anticipated. Students were significantly more likely to gain in math when: teachers introduced the lesson by placing it in the context of previously learned material; teachers praised and rewarded students frequently and were more favorable to restricting rewards to occasions when students made academic progress; teachers used behavioral objectives and attached importance to setting challenging goals; and teachers emphasized behavioral objectives and individualized instruction.

Further examination of the relationship of teaching practices to student achievement gain disclosed that certain structured teaching practices apparently affected student learning through their impact on student attention during instruction and on student task-orientation during practice periods. The more task-oriented the behavior exhibited by students, the greater their mathematics gain. Three teaching practices--teacher task-oriented behavior, teacher avoidance of harsh discipline, and monitoring of students--accounted for considerable variation in student task-oriented behavior. Evidently, the more the teachers structured their instruction, the more task-oriented were the students; and the more students were task-oriented, the greater were their gains in achievement.

SCHOOL RESOURCE USE AND RESOURCE COST

A resource cost analysis indicated that there was no statistically significant relationship between academic performance and the level of resource use in reading and math instruction within the 22 in-depth schools. We had hoped to replicate the positive relationship found in last year's study between the use of remedial math specialists and math gains, and the negative relationship between the use of instructional aides and math gains. However, this year these variables were not related to math and reading gains, although successful schools tended to have slightly higher reading resource costs than nonsuccessful schools.

We did find that principals in the schools that were successful in math achievement devoted more time to acquiring additional training through staff development activities than principals in nonsuccessful schools. Moreover, a more active role in program planning and evaluation by the principal was found to be related to higher math performance.

We also found that the way resources were used in the in-depth schools was related to math achievement gains. The more successful schools used their remedial math specialists with greater versatility than nonsuccessful schools. Moreover, successful schools tended to place greater emphasis on the professional development of their staff.

EQUALITY OF EDUCATIONAL OPPORTUNITY

One of the objectives of the ESAA Grants Program is to identify and meet "...the needs incident to the elimination of minority-group segregation and discrimination...." This objective has made equality of educational opportunity (EEO) an important outcome measure in the evaluation of the Emergency School Aid Act.

Schools in the in-depth study appeared to vary a good deal in emphasis on EEO; however, schools that emphasized one type of EEO activity tended to emphasize others. We viewed this as evidence that activities related to EEO in the schools resulted from policy decisions rather than individual teacher attitudes. Three factors that might influence such policy decisions--Pilot/Basic status of the school, percentage of minority students, and principal ethnicity--were significantly related to emphasis on EEO, and to each other. Schools with Pilot status, greater minority enrollment, and minority principals placed greater emphasis on EEO. School emphasis on EEO appeared unrelated to teacher attitudes, although it was positively related to lack of teacher bias in reinforcing practices. In examining how school emphasis on EEO and teacher behavior affected students, our findings tended to confirm the results of the 1974-75 study: in schools placing greater emphasis on equality of educational opportunity, students were significantly more likely to interact without regard to race or ethnicity; minority students were significantly more likely to perceive teachers as treating them favorably; and schools that placed greater emphasis on providing equality of educational opportunity were more successful in raising student achievement.

In summary, two in-depth studies of selected elementary schools have been conducted in connection with the evaluation of the Emergency School Aid Act. The first in-depth study identified a number of program and contextual variables apparently related to academic achievement in the ESAA schools. However, the large number of variables examined in that study made it likely that some of our findings were chance associations. Therefore, in the 1975-76 in-depth study, reported here, we concentrated upon verifying results from the previous study.

As expected, not all of the first year's study findings were replicated. However, some of the most important findings from the earlier study were confirmed--most notably, the importance of administrative leadership.

CHAPTER I

INTRODUCTION

The National Evaluation of the Emergency School Aid Act (ESAA) involved a longitudinal evaluation over a three-year period beginning with the 1973-74 school year. As part of the ESAA evaluation, in-depth studies of selected schools were conducted in 1974-75 and 1975-76. The 1974-75 in-depth study is reported in Wellisch, Marcus, MacQueen, and Duck (1976). This document reports on the methodology and results of the 1975-76 in-depth study.

The ESAA in-depth studies were designed to provide:

- Description and assessment of reading and mathematics programs and school contextual characteristics that differentially affect student academic achievement.
- Description and assessment of classroom and school characteristics that contribute to the provision of equality of educational opportunity for all students.
- Estimation of the costs associated with providing effective reading and mathematics instructional services.

To meet these objectives, the in-depth study staff conducted intensive site visits to selected schools during which program and contextual data were collected. Information on student achievement, which was used in the in-depth studies for assessing program effectiveness, was provided at the beginning and end of each school year by the longitudinal evaluation of ESAA.

So that the reader can understand the interrelationship of the two aspects of the ESAA evaluation--longitudinal and in-depth--the following section provides background on the overall Emergency School Aid Act evaluation.

DESCRIPTION OF ESAA EVALUATION

Under contracts from the U.S. Office of Education, System Development Corporation (SDC) conducted an evaluation of two closely related programs authorized under the Emergency School Aid Act (ESAA)--the Basic Grants program and the Pilot program. Basic Grants are awarded to eligible school districts to encourage the reduction of minority-group isolation, to meet the special needs incident to the elimination of segregation and discrimination, and to assist elementary and secondary school children in overcoming the educational disadvantages associated with minority-group isolation. During fiscal years 1974 and 1975, applicants for the grants were encouraged to focus their programs on improving basic skills. Basic Grants are generally awarded to (1) Local Education Agencies (LEAs) that are implementing a desegregation plan or have adopted and will implement such a plan if assistance is made available; (2) LEAs that plan to enroll non-resident children in their schools to reduce minority-group isolation; (3) LEAs that have no desegregation plan but have minority-group student enrollment exceeding 50 percent, provided that the LEAs establish or maintain at least one integrated school. Pilot Grants are awarded to LEAs for unusually promising projects designed to overcome the adverse effects of minority-group isolation by improving the academic achievement of children in minority-isolated schools. To be eligible for a Pilot Grant, an LEA must be implementing a desegregation plan or a plan to reduce minority-group isolation that would make it eligible for a Basic Grant. In addition, at least 15,000 minority-group students must be enrolled in the schools of the LEA, or minority-group students must constitute more than 50 percent of the total LEA enrollment.

The Act authorizes a national evaluation of its programs that may be supported by an annual reservation of up to one percent of appropriated ESAA funds. As designed by the U.S. Office of Education and conducted by System Development Corporation, the national evaluation effort focused on an integrated evaluation of both the ESAA Basic and Pilot programs.

GENERAL METHODOLOGY

The basic design of the combined Basic/Pilot evaluation involves comparison of treatment (ESAA-funded) and control (non-ESAA-funded) schools over a period of three years. To select the treatment and control schools in the first year of the study, pairs of similar schools were identified in sample districts; one school of each pair was randomly assigned to the treatment condition and the other to the control condition. Sample students were then drawn randomly across classes in each sample school in grades 3, 4, and 5 in the elementary schools and grades 10, 11, and 12 in the secondary schools.

In Year Two of the study, additional schools were selected into the sample to replace schools that either were not re-funded or that no longer had an ESAA program at the grades of interest. In addition, during Year Two, the sample of students was augmented to replace students who were no longer in the ESAA program. In Year Three no new schools were added, but student samples were augmented at grades 4, 5, 11, and 12 for purposes of cross-sectional analysis. Throughout the three years of the study, every effort was made to retain the original selected schools and students in sufficient numbers to conduct longitudinal analysis of the effects of the ESAA program.

The combined Basic/Pilot evaluation involved the collection of data over a period of three years, beginning in 1973 and continuing into the spring of 1976. Standardized achievement tests were administered at the beginning and end of each school year to assess gains made in reading and math by samples of students in both treatment (ESAA-funded) and control (non-ESAA-funded) schools. In the second and third years of the evaluation an additional student outcome measure, student perception of discrimination (school climate), was used. Grades included in the evaluation were third, fourth, and fifth at the elementary level and tenth, eleventh, and twelfth at the secondary level.

In addition to the outcome measures, questionnaires and other recording forms were used once each year to obtain data on district, school, and class characteristics; program operation; resource allocation; student and staff background characteristics; and student exposure to different types of educational experiences (e.g., peer tutoring in math, cultural enrichment programs).

Data analyses, conducted during the three years of the evaluation, were designed to (1) assess overall gains across both treatment and control schools by determining changes in outcome measures through the pretest-posttest method; (2) evaluate the impact of ESAA funding by comparing pretest-posttest gains in the matched treatment and control schools; (3) compare the outcomes associated with different intervention approaches; (4) identify particularly successful program characteristics by ranking the impact of local programs; and (5) analize the relationships among program features, student characteristics, and program impact. The three years of the ESAA longitudinal evaluation are reported in: Coulson, John E., Ozenne, Dan G., Van Gelder, Nancy C., Inuzuka, Diane, Bradford, Clarence, Doherty, William J., (1975), Coulson, John E., Ozenne, Dan G., Bradford, Clarence, Doherty, William J., Duck, Gary A., Hemenway, Judith A., Van Gelder, Nancy C., (1976), and Coulson, John E., Ozenne, Dan G., Bradford, Clarence, Hanes, Sally D., Doherty, William J., Duck, Gary A., Hemenway, Judith A., (1977).

During the second year of the longitudinal evaluation, an in-depth study of 24 elementary schools was conducted in an attempt to identify local program components that differentiate successful from nonsuccessful programs. During the third year of the evaluation, another in-depth study of selected elementary schools was conducted to determine if fundings from the prior study could be substantiated. The remainder of this introduction describes the in-depth studies.

IN-DEPTH STUDIES OF SUCCESSFUL PROGRAMS

The longitudinal evaluation of ESAA provides a broad description of Pilot and Basic treatment and control schools in terms of outcome measures, major program emphasis, and funding patterns; however, the longitudinal methodology cannot provide a detailed, comprehensive description of program operations at particular sites. The in-depth analysis of selected schools was designed to supplement the longitudinal study by focusing upon interactions and processes associated with the following program components:

- Organizational climate,
- Parent and community involvement,
- Characteristics of reading and math instruction,
- Resource use in reading and math instruction, and
- Equality of educational opportunity.

These components were selected for emphasis because previous research indicated that the variables comprising each component were related to student achievement. As will be noted below, the first year's in-depth study seemed to confirm their importance.

OVERVIEW OF THE IN-DEPTH METHODOLOGY

Because the primary goal of the in-depth studies conducted by SDC was to provide information that will be helpful to decision-makers, rather than to add to the literature on evaluation methodology, the major focus throughout this report is on results rather than techniques. However, since in-depth studies of successful schools represent a relatively new line of inquiry in national program evaluation, a discussion of the analytical techniques that were used is presented in the following chapter. In this section we present a brief overview of the in-depth school selection process, the selection of interviewer-observers, and the training and data collection procedures.

School Selection

Schools were selected for in-depth study on the basis of achievement gain for the year prior to the year in which the schools were visited. However, in assessing the differential effectiveness of school program variables we used achievement gain for the year in which the schools were visited.

Schools eligible to be selected for in-depth study consisted of all treatment (ESAA-funded) and control (non-ESAA-funded) schools that were in the study for both the selection year and the study year. The 1974-75 in-depth study sample was drawn from a total of 101 elementary schools; the 1975-76 sample was drawn from 78 elementary schools.

Schools were ranked separately for reading and math; then successful and non-successful schools were chosen from the top and bottom of the reading and math rankings. Twenty-four elementary schools were selected for the 1974-75 study and 26 elementary schools for the 1975-76 study.

Staff and Training for Interviews and Observations

To ensure that all needed data were collected as objectively as possible, the SDC staff developed a comprehensive training program specifically for the in-depth study data collectors. A staff of interviewer-observers was selected, all of whom had had prior academic training in education and/or extensive experience in educational settings; all were experienced interviewers and, in addition, several had prior experience in formal observation.

The training program included the following activities: observation and analysis of filmed classroom behavior; observation of video-taped and filmed instructional programs stressing behaviorally referenced objectives; role-playing experience in "depth" interviewing techniques; lesson plan and student record analysis; and practice in the use of instruments in "live" situations, with subsequent debriefing.

Data Collection

Each team of two interviewer-observers was assigned two to four schools for study. The interviewer-observer teams received no information on the achievement rank of the schools they visited.

Each team made an initial two-day orientation visit to their assigned schools, at which time they identified the classes that were to be studied. These were the two classes at each grade level (third, fourth, and fifth) that contained the majority of the students who were participating in the ESAA evaluation. The teams then returned to the schools for two weeks of data collection.

SDC developed three types of instruments that were used to collect data during the two-week school visits: observational protocols, interview schedules, and self-administered questionnaires. Structured observational protocols were used to record school characteristics and the activities, behavior, and resources in the two classes of each grade of interest. Additionally, the school principal and the teachers of the observed classes completed questionnaires and were interviewed. Instruments used in the in-depth study are published separately. See Wellisch (1977).

Data Analysis Procedures

Much of the information for the in-depth study was collected at the classroom level. However, in the 1974-75 study we were primarily concerned with examining variations among schools in program characteristics. Therefore, data collected at the classroom level were analyzed for school-level consensus. That is, after averaging multiple classroom observations, where necessary, to obtain class-level indicators, we examined these indicators to determine if a dominant pattern characterized the school. Those characteristics on which consensus was found were presumed to reflect school-level patterns.

As will be seen in Chapter IV, some class-level analyses were conducted in the 1975-76 study, in addition to the school-level analyses.

FINDINGS FROM THE 1974-75 IN-DEPTH STUDY OF ESAA SCHOOLS

As indicated previously in the in-depth study, we focused upon five components of instructional programs and the environment in which students receive instructional services. Findings from the 1974-75 study in terms of each of the five components that were analyzed are reported below.

Organizational Climate

Our analysis of organizational climate of the school covered the following dimensions: long-range objectives, policy development, instructional supervision and guidance, support provided to teachers, and teacher satisfaction. The major results from this analysis indicated that:

- Schools were significantly more likely to show math achievement gain when administrators assumed responsibility for selecting basic instructional materials.
- Schools were significantly more likely to show math achievement gain when the principal emphasized decisions regarding the selection of basic instructional materials.
- Schools were significantly more likely to show math achievement gain when teachers perceived the principal's instructional norms more accurately.

The face validity and high intercorrelations among these items suggested a common underlying dimension, which we interpreted as administrative leadership in basic skills instruction. The three items were combined into an Administrative Leadership Index that showed that schools characterized by strong administrative leadership were significantly more likely to raise math achievement and somewhat more likely to raise reading achievement.

Another result from the analysis of organizational climate was related to support provided to teachers:

- Schools were significantly more likely to show math gain where greater support for new teachers was offered. Orientation courses, inservice training, and documentation of procedures were the most common forms of support offered to new teachers.

Parent and Community Involvement

Two areas were investigated in the analysis of parent and community involvement with the school. The first was the degree to which parent involvement was associated with certain promotional activities designed to increase parent participation at school. None of the promotional activities examined in this study (e.g., holding open house, providing evening entertainment, distributing school newsletters) were found to be associated with parent participation. However, we did find that parents were more involved in schools where the principal assumed more of the responsibility for establishing policy in the area of parent-community relations.

The second area we investigated involved the relationship between parent participation and student achievement. Several interesting findings were obtained from this analysis, including:

- Schools were significantly more likely to show math gain when parents were reported present in the classroom (e.g., as paid instructional aides, volunteers, or visitors). The relation to reading achievement was also positive, although not statistically significant.

- The relationship between paid parent aides and achievement does not imply a similar relationship between the general use of paid instructional aides and achievement; in fact, where the type of aide was not specified (parent or non-parent), but where average hours of employment were compared, the use of aides was negatively related to achievement gain. Where paid parent aides were used, their hours of employment were typically short.
- We found no relationship between parent participation outside the classroom (e.g., as clerks or on advisory committees) and student achievement.

Instructional Practices in Reading and Math

Many instructional practices were examined in the in-depth study, including the use of individualized and small-group instruction, the use of behavioral objectives and lesson plans, the adequacy of instructional practice and guidance, the provision of feedback to students, and the use of positive and negative reinforcement during instruction. Two attitudinal variables were also investigated: teachers' expectations for student achievement, and teachers' perceptions of their responsibility for student learning.

We found no significant relationships between student achievement and either the use of individualized and small-group instruction or the provision of instructional guidance by the teacher. Similarly, teachers' expectations for student achievement and teachers' perceptions of their role and responsibility in student learning did not appear to be related to achievement gain. However, we found that the extent to which teachers used behavioral objectives, and the extent to which they provided students with opportunities for instructional practice and feedback (and attached importance to doing so), were positively related to reading and/or math gain. Also, we found that the extent to which teachers provided certain kinds of positive reinforcement to students was negatively related to achievement gain. These findings are summarized below.

- Results related to the use of behavioral objectives showed that schools were significantly more likely to show reading and math gain when teachers made greater use of behavioral objectives. An index was created to assess the importance and use of behavioral objectives during reading and math instruction that consisted of the following items: (1) teachers' use of student records that showed attainment of specific instructional objectives; (2) teachers' relatively high valuation of the use of behavioral objectives; and (3) teachers' emphasis on revising lesson plans (rather than abandoning objectives) when instructional objectives were not attained. The association of this index with reading and math achievement was strong and statistically significant.

- With regard to the use of practice sessions, our results indicated that schools were significantly more likely to show reading gain when practice sessions were observed to include many of the steps necessary for mastery of the lesson objectives, and when practice sessions were relevant to the lesson objectives. No relationship was found with math achievement gain.

- Results of the investigation of feedback indicated that schools were somewhat more likely to show reading and math gain when teachers attached importance to providing written and oral feedback to students on their strengths and weaknesses. This relationship was not statistically significant for either criterion.

- The investigation of the use of reinforcement showed that schools were significantly less likely to show reading achievement gain when teachers were observed praising students and singling out students as positive role models more frequently. The same inverse relationship was obtained for math achievement, but the results were not statistically significant.

The relationships between achievement and the use of behavioral objectives, the provision of adequate practice for students, and the importance assigned to providing informative feedback to students, suggested a model of the instructional process for successful schools. To test the model, we used a combined measure of the instructional process that summed the individual scores of the three instructional variables (objectives, practice, feedback). The cross-tabulation of the Instructional Process Index with student achievement showed that schools scoring higher on the index were significantly more likely to show gains in reading and math.

Regarding the use of reinforcement, additional analyses suggested that teachers who had lower expectations for their students were likely to use more positive reinforcement; greater use of positive reinforcement was associated with greater emphasis on psycho-emotional goals for the school; and schools that used more positive reinforcement were less task-oriented during instruction.

Instructional Resources Used in Reading and Math

A variety of reading and math resources and their use were analyzed including class size, instructional time in reading and math, staffing practices, equipment and materials, inservice training, and teachers' education. The allocation patterns of these resources among the successful and less successful elementary schools yielded two findings:

- Schools were significantly more likely to be successful in raising math achievement when more of their resources were allocated to remedial specialists. We found the same relationship for reading achievement, although the results were not statistically significant.
- Schools were significantly less likely to be successful in raising math achievement when more of their resources were allocated to math instructional aides (as compared to remedial specialists).

Equality of Educational Opportunity

The promotion of equality of educational opportunity (EEO) for minority-group students is one of the major legislative objectives of the Emergency School Aid Act. Our analysis of EEO in the in-depth study was based primarily on observed patterns of intergroup relations in desegregated elementary schools. Desegregated schools were examined with respect to the frequency of segregated classrooms; the existence of racial and ethnic seating patterns in class; the amount of classroom material depicting intergroup interaction; the frequency of school-sponsored cultural enrichment activities; the level of participation in cocurricular activities; and the amount of instructional reinforcement given to majority and minority students.

The primary area of interest was the relationship between the observable measures of school discrimination and student perceptions of EEO. Measures of student perceptions of EEO were derived from the School Climate Questionnaire used in the longitudinal evaluation. We were also interested in the relationships between measures of school discrimination and student achievement. In general, this analysis explored how student perceptions of discrimination might be related to school practices concerning equality of educational opportunity, and how these in turn were related to student achievement.

The major findings from these analyses were as follows:

- Slightly more than one-third of the 16 desegregated elementary schools were observed to have at least one segregated seating arrangement within desegregated classes, while three schools were observed to have at least one segregated class.

- In nine of the 16 desegregated elementary schools, at least four observed classes used some multi-ethnic materials.

- Teachers were observed directing a disproportionate amount of negative reinforcement to minority students in five schools; majority students were observed to receive a disproportionate share of negative teacher behavior in two schools.
- Student intergroup mixing during recess and lunch was observed in 12 of the 16 desegregated elementary schools.
- Eight of the 16 desegregated elementary schools showed improvement in student perceptions of EEO as measured by the School Climate Questionnaire.

In the EEO analysis, we found interesting interrelationships among these items; for example:

- Student intergroup mixing was significantly more likely to be observed in schools that contained no segregated seating patterns within desegregated classes.
- Student perceptions of teacher-student interaction were significantly more likely to improve in schools where parent visitors were reported to be representative of the racial and ethnic composition of the student body.
- Desegregated schools were significantly less likely to have a disproportionate amount of negative reinforcement directed toward minority students when the principal placed greater emphasis on social goals.
- Desegregated schools were significantly more likely to use multiethnic materials when teachers reported greater participation in decisions regarding the implementation of intercultural curricula.

In terms of the outcome measures used in the ESAA evaluation--achievement in reading and math and students' perception of discrimination--we found that:

- Student perceptions of teacher-student interaction in desegregated schools were somewhat less likely to show improvement when teachers were observed directing a disproportionate amount of negative reinforcement to minority students.
- Desegregated schools were significantly less likely to show reading achievement gain (but not math gain) when teachers were observed directing a disproportionate amount of negative reinforcement toward minority students.

SDC'S APPROACH TO THE 1975-76 IN-DEPTH STUDY

The 1975-76 in-depth study differed from the prior study in several aspects: the criteria used for selecting the study sample were more stringent, to provide greater differences in the achievement ranking of successful and nonsuccessful schools; class-level as well as school-level analyses were conducted; and additional analytical techniques were introduced. However, the most important way in which the second study differs from the first is in a narrowing of the variables of interest.

During the 1974-75 study, we examined relationships between school success and an extensive pool of variables derived both from theoretical considerations and from the results of previous research. From these relationships we were able to trace the outlines of several promising construct areas, each defined by variables that had strong predictive relationships to school success. Although encouraged by those results, we remained cognizant of the substantial probability that some of the associations were chance occurrences. For that reason, we decided to organize the 1975-76 data collection and analysis strategy around the constructs that emerged from the prior year's study. In adopting this stategy we expected to achieve two desirable objectives.

First, we were able to refine and expand our data collection efforts in certain areas that had shown promise during the first year of the study. Most changes were made in data collected through classroom observations. For instance, during Year One we had several indications based on data from teacher self-reports that the degree of lesson structuring might be an important factor related to student gain. To explore this possibility further, we collected additional observational data that might be relevant to this structuring dimension.

A second advantage of concentrating on construct areas suggested by the earlier study's results is based on statistical considerations. As the reader is aware, extensive search strategies are bound to uncover some statistically "significant" results that are caused by chance factors alone. By limiting our search in the 1975-76 study we hoped to increase confidence in those results that appeared to explain differences between successful and nonsuccessful schools.

Chapter II discusses the sample selection and analytical strategies used in the 1975-76 in-depth study. Subsequent chapters describe the study results.

CHAPTER II

SAMPLE SELECTION AND ANALYTICAL STRATEGIES

The purpose of this chapter is to describe the site selection methods and analytical strategies used in the 1975-76 in-depth study. In the chapter we explain how particular methods correspond to the objectives of the study. We discuss the considerations involved in selecting certain analytical techniques and the limitations imposed by a particular strategy on the interpretation of study findings. The chapter contains a section on sampling methodology, describing our procedures for selecting schools and classrooms for in-depth study; a section describing methods for constructing indices of school success; a section on the study's analytic procedures, where construction of composite variables on school factors that may be related to school success is described; a section presenting a brief overview of the statistical methods employed; and a final section discussing the limitations of our study methodology.

IN-DEPTH SAMPLING METHODOLOGY

CONSIDERATIONS IN SAMPLE SELECTION

Second-year in-depth study sample schools are a subset of schools from the larger ESAA study sample.* The in-depth study sample includes elementary schools from the treatment and control groups and from the Pilot and Basic groups, but is not representative of elementary schools in the larger study sample. Instead, the in-depth sample is a purposeful selection of successful

*Most of the schools in the second in-depth study sample are not the same as those in the previous study sample. We would have, of course, preferred to maintain our sample so that continuity of school-level effects during the two years could have been assessed. Unfortunately, some school districts with 1974-75 in-depth study sample schools did not participate in the 1975-76 ESAA program. As a consequence, we were forced to reconstitute our sample. We did make an effort to select schools that had been studied in Year One, however; eight of our 26 elementary schools, two of which were successful schools, were carried over from the first-year sample.

and nonsuccessful schools chosen from the top and bottom of the achievement gain distribution for the total study sample. In the selection of elementary schools, position in the achievement gain ranking was given primary consideration. Only after schools met strict criteria for success/nonsuccess based on achievement gains did we introduce secondary considerations, such as preference for schools from the first year of the study and social background characteristics of the student body.

We chose to construct the in-depth sample in this way because of our interest in those school organization and program factors that might be responsible for differences in student achievement gains. By selecting schools with large differences in student gain, we expected to increase our potential for identifying those factors. Our expectation was based on the intuitively plausible and statistically demonstrable proposition that large measured differences are more reliable indicators of real differences than are smaller ones close to the center of the achievement gain distribution. Smaller differences may be due to chance factors, or to measurement error alone. Since we did not want to make causal inferences about differences that might have occurred by chance, we elected the extreme-case selection method.

The decision to make achievement gain the primary selection criterion for 1975-76 in-depth study schools represents a departure from the sampling procedures employed during the first year of the study. In Year One, differences in achievement gain were a key consideration, but additional constraints were introduced in order to match successful and nonsuccessful schools on geographic location within the United States, on rural-urban character of the district, on racial/ethnic composition of the student body, and on socioeconomic status. Use of these additional criteria forced us to include some schools that were within ten percent of the median on the overall achievement gain ranking.

Inclusion of schools that were only marginally successful or nonsuccessful contributed to a problem that became apparent when last year's data were analyzed. When selection and outcome rankings were compared, a number of schools reversed their relative positions from successful to nonsuccessful and from nonsuccessful to successful. These first-year results are shown in Table II-1, which is reproduced from our first-year report.

The table illustrates a fundamental problem common to any study in which successful and nonsuccessful schools are selected and their performance is evaluated

Table II-1. Number of Elementary Schools That Maintained Their Relative Ranking Between 1973-74 and 1974-75

		1974-75 Reading Rank		
		High	Low	
1973-74 Reading Rank	High	6(40.0)	9(60.0)	15(62.5)
	Low	3(33.3)	6(66.7)	9(37.5)
		9(37.5)	15(62.5)	24(100%)

		1974-75 Math Rank		
		High	Low	
1973-74 Math Rank	High	7(46.7)	8(53.3)	15(62.5)
	Low	7(77.8)	2(22.2)	9(37.5)
		14(58.3)	10(41.7)	24(100%)

over time. The selection of schools is always based on data available prior to the study period. Actual achievement gains during the study period may differ markedly from those upon which the sample selection was based. Many studies have ignored this problem, using data gathered during the study period to "predict" achievement data that were used for sample selection. That would be of small concern if cross-year achievement gains were stable, but the information in Table II-1 indicates that this is not the case. Moreover, data from the total ESAA sample are conclusive on this point. Across the total ESAA longitudinal sample of elementary schools, the correlation of school achievement gains from Year One to Year Two and from Year Two to Year Three is not significantly different from zero. This finding points to the problem that must be confronted in our type of study, and it was a key consideration in our decision to set aside the matching constraints used in the first year of the study. In so doing, we hoped to identify schools with stable cross-year differences in achievement gain. In the paragraphs that follow we outline our sampling procedures for selecting elementary schools. In the section on outcome measures we report the degree of our success in selecting schools that maintained their level of achievement gain.

SAMPLE SCHOOL SELECTION

Our objective in selecting elementary schools for the 1975-76 in-depth study was to include only schools with a consistent pattern of either high or low achievement gain, both across grades and in the two basic skill areas of reading and math achievement.* Since we planned on a total of 26 elementary

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*The California Achievement Test, Levels 2 and 3, Forms A and B were used in the ESAA evaluation to assess academic growth in elementary schools. A "debiased" scoring system (i.e., a scoring system that excludes items that are potentially biased against minority students) was developed for these tests; however, it was determined that differences between the full-scale scores and the debiased scale scores were trivial and non-significant (Ozenne, Van Gelder, and Cohen, 1974). As a result, calculations of student achievement scores were based on the full set of items originally included in the test battery (Tiegs and Clark, 1970).

schools, the sample was to be divided into 13 successful and 13 nonsuccessful schools. To select successful schools, 78 elementary schools that were in Years Two and Three of the ESAA evaluation were first ranked in terms of the number of grades showing improvement in national percentile norms in reading and math between the fall 1974 and spring 1975 testings. Schools were rated "successful" in a particular skill area when two of the three grades tested (grades 3, 4, and 5) showed improvement in national percentile norms. We gave first preference to schools that were rated successful in both skill areas. Nine schools from the total sample met this criterion. Four additional schools were included that were successful in only one basic skill area, but in these schools all three grades improved in that basic skill area. The comparison sample of 13 "nonsucessful" schools was chosen from elementary schools at the bottom of the achievement distribution. In these schools, at least two of the three grades tested ranked among the lowest 30 percent of the total sample in raw gains in both skill areas.

CLASSROOM SELECTION IN SAMPLE SCHOOLS

SDC's interviewer-observer teams made two-day orientation visits to in-depth study sample schools during February, 1976. During those visits they compiled rosters of classrooms where ESAA-designated students received reading and mathematics instruction. In many cases the rosters included both regular classrooms and special or remedial classrooms where ESAA students received "pull-out" instruction. From these rosters we selected classrooms with the greatest concentration of ESAA students. Where possible, we selected a minimum of two regular classrooms at each participating grade level.* In schools where students received additional remedial instruction in pull-out classrooms, we endeavored to collect interview and observation data in one pull-out classroom at each grade level. In some schools the interviewer-observer schedule did not permit complete coverage of pull-out classes at all grade levels. In those schools

*In cases where resources permitted, we selected up to four classrooms per grade.

we asked our teams to concentrate on classrooms where pull-out teachers served more than one grade level. As a consequence, our data permit an adequate characterization of the reading and math instruction received by ESAA sample students in both regular and remedial situations in all 26 schools. These data consist of interview, questionnaire, and observation information collected in 176 classrooms.

OUTCOME MEASURES

SCHOOL-LEVEL ACHIEVEMENT OUTCOME MEASURES

When 1975-76 achievement gain data became available (in August, 1976) we reassigned all 26 in-depth elementary schools to achievement outcome categories for analytic purposes. Three separate classifications of school success--one for reading, one for math, and one that combined gains in both reading and math--were constructed. We maintained these distinctions because we reasoned that some school factors, such as use of reading or mathematics specialists, would be associated with gains in a particular skill area. Other factors, such as administrative leadership in instruction, might affect both basic skills areas. Our objective in forming each of the three classifications was to create two groups of schools that were substantially different in their degree of success in raising student achievement. We noted earlier that we had used an extreme-case selection method with the expectation of increasing the separation between achievement outcome categories. In fact, we were only partially successful in this respect; as a result, some schools were excluded from certain analyses, as we explain below.

To classify the 26 in-depth elementary schools, we began by ranking them according to the number of grades showing an improvement in national percentile for reading and math separately. In each skill area, schools were termed successful when at least two of the three grades tested showed improvement in national percentile standing between the fall 1975 and spring 1976 testings. Schools were considered to be nonsuccessful when no grade showed percentile improvement.

Application of these criteria identified some schools that could not be classified as either successful or nonsuccessful. In reading, seven elementary schools were classified as successful, ten were nonsuccessful, and nine were in the unclassified or "neither" category. In math, six schools were successful, eight were nonsuccessful, and twelve were neither successful or nonsuccessful.* Schools falling into the "neither" category were excluded from the relational analyses of school success and reading and math program characteristics, in the interest of maintaining clear distinctions between the two categories of schools. As a matter of fact, several preliminary analyses indicated that inclusion of the questionable cases obscured the relationships between school factors and achievement gains.

When marginal schools were excluded from the separate reading and math outcome classifications, no schools were classified as successful in one basic skill area and nonsuccessful in the second area. That is, all schools that were successful in one skill area were either successful in the second area or they fell in the "neither" category. This outcome made it possible to combine the separate reading and mathematics classifications into a single overall measure of school success/nonsuccess. For this overall index, a school was classified as successful if it was successful in one or the other basic skill area; a school was classified nonsuccessful if it was nonsuccessful in either basic skill area. Application of these criteria resulted in the identification of nine successful and thirteen nonsuccessful schools. Table II-2 shows the number of schools in each category for reading, math, and combined reading/math.

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*One school with only one grade tested was classified "neither." Two schools with only two grades tested were classified as follows: One was classified "successful" in reading and "neither" in math (one of two grades in reading gained and no other grades in either area dropped). The other school was classified "neither" in both areas. (One of two grades in math gained, the other did not drop, but both grades in reading dropped.)

Table II-2. Number of Schools Showing Improvement in National Percentile Standing During 1975-76

Number of Schools		
Reading Achievement	Math Achievement	Combined Achievement
Successful..... 7	Successful..... 6	Successful..... 9
Nonsuccessful....10	Nonsuccessful... 8	Nonsuccessful.....13
Total....17	Total...14	Total.....22
Neither.....9	Neither.....12	Neither.....4
Total....26	Total....26	Total.....26

Operational Definitions:

Reading Achievement, Math Achievement*

Successful = two of three grades tested gained in national percentile
Nonsuccessful = no grades gained in national percentile
Neither = meets neither the success nor the nonsuccess criteria

Combined Achievement

Successful = meets the successful criterion for either reading or math
Nonsuccessful = meets the nonsuccessful criterion for either reading or math
Neither = meets neither criterion

*Two schools with only two grades tested were classified as follows: One was classified "successful" in reading and "neither" in math (one of two grades in reading gained and no other grades in either area dropped). The other school was classified "neither" in both areas (one or two grades in math gained, the other did not drop, but both grades in reading dropped).

The results of our attempt to select schools with a consistent cross-year pattern of success/nonsuccess are displayed below in Tables II-3 and II-4. As is evident in the tables, selecting extreme cases did increase the cross-year correlation of achievement gains over that observed in the total sample. There was a substantial positive association between the selection measure and the combined outcome measure.* These results compare favorably with the cross-year association for the total sample, which was not significantly different from zero. In spite of these results, we are, of course, disappointed by the nonstability also shown in the tables. Exclusion of marginal schools from the analyses increased the clarity of certain key relationships, but reduced the power of our statistical tests.

Student Background Characteristics in the Successful and Nonsuccessful Schools

While this study focuses on school and classroom variations as determinants of student achievement, there is considerable research demonstrating that student background accounts for most of the variation in student achievement. Therefore, it is important to know whether achievement gains made by ESAA in-depth students are accounted for by student background (socioeconomic status and race/ethnicity) or whether educational programs have an impact over and above background characteristics.

Minority enrollment in the ESAA In-Depth study school ranged from 5 percent to 100 percent; the minority population was largely Black. In the nine successful schools (reading/math combined), minority enrollment averaged 79 percent; in the 13 nonsuccessful schools, minority enrollment averaged 63 percent. Average enrollments in the schools that were successful and nonsuccessful in reading only and math only were comparable (85 percent and 61 percent, reading; 69 percent and 55 percent, math). None of these differences were significant.** Socioeconomic status (SES) was indexed by students' reports of the number of

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*Tau c = .52, α = .01.

**Significance levels were determined by two-tailed t-tests.

Table II-3. Number of Schools Maintaining Their Position in Reading Achievement and in Math Achievement From 1974-75 to 1975-76

		1975-76 Reading Achievement			
		Nonsuccessful	Neither	Successful	Total
1974-75 Reading Achievement	Nonsuccessful	7	7	1	15
	Successful	3	2	6	11
	Total	10	9	7	26

		1975-76 Math Achievement			
		Nonsuccessful	Neither	Successful	Total
1974-75 Math Achievement	Nonsuccessful	6	8	1	15
	Successful	2	4	5	11
	Total	8	12	6	26

Table II-4. Number of Schools Maintaining Their Positions in Achievement (Reading/Math Combined) From 1974-75 to 1975-76

		1975-76 Achievement Reading/Math Combined			
		Nonsuccessful	Neither	Successful	Total
1974-75 Achievement Reading/Math Combined	Nonsuccessful	9	3	1	13
	Successful	4	1	8	13
	Total	13	4	9	26

luxury items in their homes. School SES averages were lower in successful schools than in nonsuccessful ones, but again the differences were not significant.* (In addition to being statistically nonsignificant, the direction of these associations runs counter to expectations.) Because of the basic similarity of successful and nonsuccessful schools in the sample, we did not control for SES and race/ethnicity in the relational analyses reported in this document.

CLASS-LEVEL ACHIEVEMENT OUTCOME MEASURES

In the earlier in-depth study the analysis was primarily concerned with examining school-level, rather than class-level, variations in program characteristics. Data collected at the classroom level were aggregated to the school level, and the extent of response agreement at the school level was determined for each indicator. Items on which consensus was obtained were presumed to reflect school-level indicators.

In this year's study, because of the reduced sample size caused by the loss of the marginal schools, we decided to conduct some classroom-level analyses relating program inputs to achievement gain. In these analyses we considerably increased the number of cases by using classroom data from all 26 elementary schools. The principal benefit of this increase in sample size from 17 (schools) to 105 (classes) in reading and from 14 (schools) to 98 (classes) in math was that it made possible the use of the multiple regression technique. The procedures that were used to construct the class-level achievement gain measure are described below.

The purpose of the classroom-level analysis was to relate classroom inputs to student achievement gains. The principal problem in constructing the outcome index for this analysis arose because ESAA sample students often received reading and mathematics instruction from more than one teacher. In most of these

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*Significance levels were determined by two-tailed t-tests.

cases the student received regular instruction from a homeroom teacher and additional instruction from a remedial specialist teacher in a "pull-out" classroom or laboratory. Sometimes we did not have adequate data to characterize the instruction received in these special situations. Since we could not describe all reading and math program inputs received by all ESAA students, we constructed an outcome measure based only on those students for whom there was complete data. The measure we constructed is the average gain of students who received all their reading or math instruction from a single teacher. Since the average gain score varies by grade, we standardized* individual student gain scores by grade levels before averaging to create classroom-level indicators. To increase the reliability of the outcome measure, we computed values only for classes where the teacher provided all instruction to at least five ESAA students.

SCHOOL CLIMATE OUTCOME MEASURE

In addition to achievement outcome, a second measure of success was used in the ESAA evaluation. This was a measure of students' perception of discrimination in the school. Information on students' perceptions was obtained through the School Climate Questionnaire, which was administered in the fall and spring of 1974-75 and 1975-76. In Chapter VI, Equality of Educational Opportunity (EEO), we describe our analyses of the relationships between EEO activities in the

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*We will have several occasions to refer to the process of standardizing item or scale scores. This is a frequently used procedure in social research when one wishes to compare or combine scores that have something in common, but are expressed in different units. When we standardize scores we make these combinations or comparisons possible by equating the means and standard deviations of the separate items or scales, i.e., by expressing each score in terms of its deviation from the mean of its distribution in standard deviation units, $Z = \frac{X_i - \bar{X}}{sd}$.

Where: Z equals a particular score in standardized units;
X_i equals the score of the ith observation;
$\bar{X}$ equals the mean of all the values that X assumes; and
sd equals the standard deviation of the distribution of X.

schools and an index of students' perceptions of discrimination from the School Climate Questionnaire.

INDEPENDENT VARIABLE CONSTRUCTION

In many of the analyses reported in this document, the indicators of school and classroom variables are multiple-item composites. We constructed such composites whenever several items were conceptually related to an underlying construct, and when the correlations between these items were sufficiently strong. Under these circumstances, the use of composites has two principal advantages. First, it compresses the data, simplifying subsequent analyses and interpretations. Second, the composites so constructed are better estimates of the underlying construct than any individual item would be separately.*

Our procedures for constructing composites varied somewhat, depending upon the response distributions of the set of items used to create the index.

- When the items in the set were on the same metric and had similar response distributions, we took a simple sum or mean of the individual item scores as our scale score. A good example of this procedure is the index of teachers' attitudes about the importance of improving intergroup relations. That scale is the sum of four items, each referring to the importance of a particular intergroup relations activity. Each item was scored within a possible range of 1 to 5, from unimportant to very important. If there had been missing data for any item, we would have used a mean value rather

*This is because construction of the composite reduces the contribution of random measurement errors to scale score estimates of the underlying construct. There are several methods of estimating the amount of that reduction, based either on the intercorrelations of the individual items or on the item to scale correlations. We followed David J. Armor's method (Armor, 1974) This method yields an internal consistency "reliability" coefficient, which estimates the proportion of scale score variation due to factors common to the set of items. Our policy was to include items in a composite when that inclusion made conceptual sense, and when so doing increased our estimated internal consistency reliability.

than the sum, basing it on only those items for which we had valid responses.

- When responses to a set of items were badly skewed or where they were expressed in different units, we first standardized the individual item responses. After standardization, the items were combined by taking sums or means. A good example of this procedure is the Student Task-Oriented Behavior Scale in the chapter on reading and math program characteristics. That scale combines four items with unstandardized values from 1 to 3 through 1 to 5. By first standardizing these items we were able to ensure that each item's contribution to the variation in the total scale score was equal.

STATISTICAL TECHNIQUES EMPLOYED IN THE IN-DEPTH STUDY

In this section we identify the conventions we have adopted for (1) describing relationships between two variables; (2) reporting the level of statistical significance of those relationships; and (3) summarizing and decomposing multivariate relationships.

One of the major objectives of this study has been to examine relationships between school and classroom variables and various outcome measures. In describing these relationships we usually report the value of one of several measures of association (Tau c, Pearson's or Spearman's correlation coefficient), depending upon the characteristics of the data in question. Each of these statistics has a different mathematical interpretation, but all range from -1 to +1. Each takes on its highest and lowest values when knowledge of the value or rank on one variable will allow perfect assignment of value or rank on the second variable. Positive associations mean that high values on one variable are associated with high values on the second variable. Negative associations mean that high values on one are associated with low values on the other. A value of "0" on any of the measures means that there is no association between the two variables. While the various measures of statistical association

reported here do not have equivalent mathematical interpretations, we have elected to use the nomenclature recommended by Davis (1971), which is reproduced below, to describe those relationships.

Value of Measure of Association	
+.70 or higher	A very strong positive association
+.50 to +.69	A substantial positive association
+.30 to +.49	A moderate positive association
+.10 to +.29	A low positive association
+.01 to +.09	A negligible positive association
.00	No association
-.01 to -.09	A negligible negative association
-.10 to -.29	A low negative association
-.30 to -.49	A moderate negative association
-.50 to -.69	A substantial negative association
-.70 or lower	A very strong negative association

In addition to reporting measures of association, we sometimes report that two groups of schools have different mean values of a particular variable.

In each case where we report a value for a measure of association or a difference of means, we have either indicated a level of significance for that relationship or indicated that the relationship is not significant (NS). The procedures for calculating the level of significance vary, but the interpretation of the significance values is the same. In each case the significance value is the probability of finding a relationship of the observed magnitude, if the particular sample had been randomly drawn from a population in which there was no relationship between the two variables. Low values indicate that the observed relationship was unlikely to occur by chance. For instance, a value of .05 means that an association could have occurred by chance only 1 in 20 times. Following accepted convention, we have termed relationships significant only when they meet the .05 level of significance. We report exact levels of significance (without comment) down to .10, however.

In the examination of reading and math program characteristics we investigated the relations of several independent variables to a single achievement outcome measure. The basic technique used for summarizing and decomposing these relationships was multiple regression. In the multiple regression technique, a prediction equation is constructed that expresses how scores on several predictor variables should be weighted and combined to achieve the best (linear) prediction of a dependent variable. In these analyses we also report the value of the multiple correlation coefficient (R), which summarizes the accuracy of the total prediction equation. The square of this value is the proportion of the total variation (variance) in the dependent variable that can be explained or predicted from knowledge of all the independent variables in the equation.

STUDY LIMITATIONS

Even though the 1975-76 in-depth study was more in the direction of hypothesis-testing than our previous study, findings reported here should be interpreted with caution, taking into account certain limitations imposed by the study design. First, the in-depth study was not an experiment. Neither schools nor students were randomly assigned to the different treatment conditions or program approaches being compared; rather, the study depended upon natural program variations among the selected schools. In such a design, school outcome differences attributed to program variations may, in fact, reflect uncontrolled differences in other variables, such as socioeconomic status or other background characteristics of students. However, neither student race or socioeconomic status differed significantly in the 1975-76 successful and nonsuccessful sample schools. Interpretations concerning causal relationships between program characteristics and outcome measures must be tentative. Nevertheless, the study does provide evidence of possible causal and policy-relevant relationships involving school success.

Second, the in-depth school sample was in no sense representative of the total school or student population in this country. Thus, "successful" schools are actually successful relative to the total ESAA evaluation sample and not to the

general school population. Similarly, relationships found here between program characteristics and school success can at most be generalized only to schools like those in the ESAA evaluation, and may not apply to schools with pronounced differences from those studied.

Third, elimination of marginal schools from the school-level analyses restricted our sample size, making the use of multivariate techniques infeasible at this level. We did use these techniques in the class-level analyses, but here again the relatively small sample size limited the number of variables that could be simultaneously examined in a multivariate analysis.

Other constraints arise from the use of program indices for which no good external benchmarks are available. For instance, one index concerned the frequency of observed interaction among students of different racial/ethnic groups. Since no data are available for this measure outside the in-depth sample schools, there are no normative or comparative standards; therefore, the designation of certain ranges of index values as "high" or "low" must be largely arbitrary. Scale scores used in this study are used solely to compare the in-depth schools with one another and carry no connotation that a high score is good or that a high score among the in-depth schools would be high among all schools.

ORGANIZATION OF THE REPORT

The remainder of this document reports our findings related to Organizational Climate, Reading and Mathematics Program Characteristics, Resource Use, and Equality of Educational Opportunity. In the 1974-75 in-depth study we also reported findings in connection with Parent and Community Involvement. This year, our analyses in this area did not show any consistent patterns. Each of the subsequent chapters is organized around major questions that arose out of our 1974-75 findings and were explored in the 1975-76 in-depth study.

CHAPTER III

ORGANIZATIONAL CLIMATE

This chapter examines differences in how schools are organized and managed, and how these differences are related to student achievement. The inquiry focuses on three questions:

- Is leadership in instruction by administrators related to gains in student achievement?
- Is the coordination of instructional programs throughout the school related to gains in student achievement?
- Is the setting and maintaining of academic standards related to gains in student achievement?

We were particularly interested in the first of these three questions because of findings in the 1974-75 in-depth study. In that study, three dimensions of administrative leadership were found to be related to achievement: administrators' concern for instruction, communication of a point of view on instruction, and responsibility for instruction. Schools were more likely to raise student achievement where administrators rated high on all of these dimensions--that is, where leadership in instruction was greatest. The second and third questions on program coordination and academic standards stem from our interest in determining more specifically the differences in organization and management that distinguish successful from nonsuccessful schools.

In this chapter we present findings from the 1975-76 study that bear on these three questions, and describe a profile of management and organization in successful schools.

IS LEADERSHIP IN INSTRUCTION BY ADMINISTRATORS RELATED TO STUDENT GAINS IN ACHIEVEMENT?

In the 1975-76 in-depth study, three aspects of administrative leadership were again examined for relationships with achievement: how strongly administrators felt about instruction, whether they communicated their ideas concerning instruction, and the extent to which they assumed responsibility for instruction. The following paragraphs summarize the findings relating these aspects of administrative leadership to achievement.

ADMINISTRATORS' ATTITUDE TOWARD INSTRUCTION

We assessed the principal's attitude toward instruction by asking teachers and principals if the principal felt strongly about instruction, had definite ideas, and promoted a point of view (B-1).* Eleven principals stated that they did. Four reported that they expressed some opinions but did not promote them, and seven said they generally allowed teachers to develop their own programs. One principal volunteered that he hired new staff with what he called the "school philosophy" very much in mind.

Scores in successful and nonsuccessful schools, representing combined principal's and teachers' assessments of the principal's attitude about instruction, may be compared by inspecting Table III-1. Higher scores indicate that principals felt more strongly about instruction. As shown in the table, schools where principals felt strongly about instruction were significantly more likely to show gains in achievement.

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*Parenthetical references, e.g., (B-1), refer to tables containing supportive material that are found in Appendix B. Response distributions, scoring procedures, inter-item correlations and other descriptive analyses are included. In addition, readers should be aware that except in those few cases indicated in text or footnotes, all data describing school organization were derived from interviews with teachers and principals, whose responses were combined whenever there was sufficient agreement.

Table III-1. Student Achievement and Three Aspects of Administrative Leadership

ASPECT OF LEADERSHIP	COMBINED READING/MATH ACHIEVEMENT* MEAN SCORES		SIGNIFICANCE
	Successful N = 9	Nonsuccessful N = 13	
1. Administrative concern for instruction	2.7	1.5	.02
2. Communication of views on instruction by regular review and discussion of teaching	1.4	0.4	.003
3. Responsibility for decisions concerning program planning	3.3	3.0	.05

SIGNIFICANCE levels were determined with one-tailed Mann Whitney U tests, which assign ranks to each school according to the magnitude of the original scores.

SCORING:

1. Scores have a possible range of 0 to 4; 0 indicates unanimous opinion that the principal was little concerned; 4 indicates unanimous opinion that the principal felt strongly.

2. Scores have a possible range of 0 to 2; 0 indicates reports were unanimously negative; 2 indicates they were unanimously positive.

3. Scores have a possible range of 1 to 5, indicating least through most administrative responsibility, respectively.

*Comparable data for separate reading and math criteria are given in Appendix B, Table B-7.

COMMUNICATION OF VIEWS ON INSTRUCTION BY ADMINISTRATORS

In addition to finding out how strongly principals felt about instruction, we were interested in how they communicated their concern. One specific means was examined: the regular review and discussion of teaching performance (B-2). Combined principals' and teachers' reports about the performance review process are summarized in Table III-1. Scores are higher where more staff reported that teaching performance was regularly reviewed and discussed; scores are lower where more staff reported that it was not. As shown in the table, schools where teaching performance was regularly reviewed and discussed were significantly more likely to show achievement gains.

Two less direct means of communicating views on instruction were also related to achievement. Faculty meetings where instructional methods were discussed (B-3), and in-school meetings on educational theories and concepts (B-4), tended to be held more frequently in successful schools.* Although we assumed that administrators expressed their views in these meetings, either directly or by exercising prerogatives in the choice of topics, we were inclined to regard both kinds of meetings as tangential evidence of communication about instruction. Consequently, in subsequent analyses we have used the most direct indicator of administrative communication concerning instruction: the regular review and discussion of teaching performance.

Because it might be argued that communication between administrators and teachers is an indication of good working relations among staff, and that good working relations may be sufficient to account for a school's success in raising student achievement, we also examined communication that did not necessarily concern instruction. We found no evidence that communication in general promotes

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*The relationship with frequency of faculty meeting discussions on instructional methods was not significant. The relationship with frequency of in-school meetings was significant, but was based only on data from principal questionnaires.

academic achievement. That is, there was no relation between student achievement and the judgments of teachers and principals on how well they kept one another informed. Communication specifically concerning instruction, on the other hand, was related to achievement, particularly the regular review and discussion of teaching performance.

ADMINISTRATIVE RESPONSIBILITY FOR INSTRUCTION

A third aspect of school leadership, administrative responsibility for instruction, was assessed by examining teachers' estimates of how they and administrators shared decisions concerning instruction in three areas: in selecting basic instructional materials, in planning programs for the entire school, and in evaluating school programs (B-5). Estimates were given in terms of five descriptive response options that provided a continuum from more to less administrator responsibility for instructional decisions. Three of these options indicated that responsibility was shared and two indicated that decisions were made unilaterally, either by administrators or by teachers. Teachers' estimates were higher in each decision area concerning instruction in successful schools, indicating that administrators assumed more responsibility in these schools. However, as shown in Table III-1, the relation of student achievement to these estimates was significant for just one decision area: program planning.

An index of administrative responsibility in all three instructional areas was constructed by summing the number of decision areas in which teachers attributed more responsibility to administrators (B-6). (Median scores were used to define cutoff points for "more" and "less" responsibility.) Schools where teachers attributed more responsibility to administrators in a greater number of areas were significantly more likely to be successful ($\alpha \leq .04$, Fisher's Exact Test).

Another measure of the responsibility administrators assumed for instruction is reported in Chapter V. The time principals devoted to developing new reading and math curricula and to planning and evaluating reading and math programs

was significantly and positively related to student achievement. Although there was little tendency in the in-depth schools for teachers' estimates of administrative responsibility for instruction to correspond to principals' reports of the time they devoted to instructional activities, where they did agree (in 11 of the 22 schools), the relationship to achievement was strong ($\alpha \leq .01$, Fisher's Exact Test). In six schools, teachers and principals both indicated that administrators were more responsible. Five of these schools were successful. All schools where both teachers and administrators indicated that administrators were less responsible, were nonsuccessful.

ADMINISTRATIVE LEADERSHIP IN INSTRUCTION

In addition to being related to achievement, each of these aspects of administrative leadership was positively related to the other two.* For example, where administrators felt strongly about instruction they also communicated their views and assumed responsibility for decisions concerning instruction. This confirmed the usefulness of measuring leadership in more general terms by combining these three dimensions. The number of dimensions on which a school was classified high was used as an index of administrative leadership in instruction. To construct this index, the 22 in-depth schools were classified high or low on each dimension, according to whether a score was above or below the median. Index scores ranged from 0 to 3. Table III-2 shows the distribution of these scores in relation to the successful/nonsuccessful classification of the schools. The results closely parallel those for the 1974-75 in-depth study schools, which are also shown in Table III-2.** For both samples, schools were significantly more likely to raise student achievement where administrators rated high on all of these dimensions; that is, where administrators were characterized by strong leadership in instruction.

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*The complete set of inter-item correlations for indicators reported in this chapter is given in Table III-4.

**Items used to assess administrative leadership in the 1974-75 in-depth study are shown in Table B-8, Appendix B.

Table III-2. Student Achievement and Administrative Leadership

Administrative Leadership		Achievement* 1975-76 N	S		1974-75 N	S	
	Low	11	2	13	8	3	11
	High	2	7	9	2	11	13
		13	9	22	10	14	24
		$\alpha \leq .02$			$\alpha \leq .02$		

SIGNIFICANCE levels were determined with Fisher's Exact test.

ADMINISTRATIVE LEADERSHIP INDEX SCORES:

High = 2, 3 on scale composed of three indicators
Low = 0, 1 on scale composed of three indicators

Indicators**

- administrative concern for instruction
- administrative communication about instruction
- administrative responsibility for decisions concerning instruction

CODE: S indicates successful; N indicates nonsuccessful.

*The 1974-75 math achievement criterion approximates the 1975-76 combined criterion measure. (See Chapter II.) As reported in the 1974-75 in-depth study, all schools successful in math were also successful in reading; however, nonsuccessful schools in that study were "all others."

**Items used for each indicator in 1975-76 are compared with those used in 1974-75 in Table B-8, Appendix B.

IS THE COORDINATION OF INSTRUCTIONAL PROGRAMS THROUGHOUT THE SCHOOL RELATED TO GAINS IN STUDENT ACHIEVEMENT?

Teachers and principals were asked to what extent the school's instructional program was coordinated (B-9). Fifteen principals and teachers in half the schools believed their instructional program was coordinated to a large extent, both in many aspects (content, sequence of objectives, and use of materials) and throughout all grades. One principal felt that the school's program was coordinated very little--that each teacher generally planned an instructional program for that teacher's class. The remaining principals and teachers believed that their programs were coordinated to some extent. Teachers' and principals' scores were combined; high scores indicated that programs were extensively coordinated and low scores that they were coordinated only to a limited extent. Based on these staff estimates, schools were significantly more likely to show gains in student achievement where instructional programs were more extensively coordinated ($\alpha < .01$, Mann Whitney U test).

Several principals volunteered descriptions of the manner in which their schools' programs were coordinated.* These comments, which concerned testing and placement procedures, provided tentative evidence that programs were coordinated in response to particular goals. One principal emphasized frequent testing, and explained that the school attempted to be flexible in placing students, making changes whenever academic progress suggested that a student would benefit. Schoolwide coordination of instructional programs would seem not merely desirable but altogether necessary for the kind of educational opportunities this school was attempting to provide.

IS THE SETTING AND MAINTAINING OF ACADEMIC STANDARDS RELATED TO GAINS IN STUDENT ACHIEVEMENT?

We collected three kinds of information that bear on this question (B-10). Each type points to the conclusion that successful schools were distinguished

*As this information was entirely volunteered, no generalizations about relationships with achievement or anything else are based upon it.

by policies that emphasized academic standards. First, as shown in Table III-3, students were significantly more likely to repeat a grade to meet academic standards in successful than in nonsuccessful schools.* Second, there was a tendency, although nonsignificant, for principals of successful schools to oppose the setting aside of basic skills for low-achieving students until they were ready to learn. Third, although administrative review of teaching performance does not apply to students directly, action that encourages quality teaching is generally assumed to result in quality education. As we reported (see Table III-1), principals in successful schools were significantly more likely to review and discuss teaching performance regularly with their staff.

Table III-3. Student Achievement and Promotion Practices and Policies

		Achievement: Combined Reading/Math		
		N	S	
Promotion Practices	No Students Repeat	10	3	13
	Some Students Repeat	3	6	9
		13	9	22

$\alpha < .05$

SIGNIFICANCE levels were determined with Fisher's Exact Test.

CODE: S indicates successful; N indicates nonsuccessful.

*This information is from principal questionnaires.

MANAGEMENT AND ORGANIZATION IN SUCCESSFUL SCHOOLS

Correlational analysis indicated that in addition to administrative leadership in instruction, effective school management and organization included an emphasis on academic standards and extensive coordination of instructional programs. The remaining paragraphs of this chapter discuss the associations between academic standards, coordination of instructional programs, and the three dimensions of administrative leadership: concern, communication, and responsibility for instruction.

Correlations among the indicators reported in this chapter were all positive, and ranged in strength from low through substantial. An exception occurred with in-school meetings on educational theories and concepts. Correlations of this indicator with others were low or negligible. The complete set of correlations among the indicators is given in Table III-4.

An index of effective school management and organization was constructed by first classifying the 22 in-depth schools high or low on each indicator according to whether scores were above or below the median. Indicators were:

- teachers' and principals' assessments of how strongly the principal feels about instruction;
- teachers' and principals' reports of whether teaching performance is regularly reviewed and discussed;
- teachers' estimates of the responsibility assumed by administrators in decisions concerning instruction;
- teachers' and principals' reports of the extent to which instructional programs are coordinated throughout the school;
- principals' reports of whether students who did not meet academic standards repeated grades.

Table III-4. Correlations Among Indicators of Administrative Leadership in Instruction

DIMENSION INDICATORS

I. Administrative Concern for Instruction:

*(a) combined teachers' and principals' assessments of the principal's attitude toward instruction

II. Communication of an Administrative Point of View on Instruction:

*(a) combined teachers' and principals' reports of whether teaching performance is regularly reviewed and discussed

(b) combined teachers' and principals' estimates of how frequently instructional methods are discussed at faculty meetings

III. Administrative Responsibility for Instruction:

*(a) teachers' estimates of responsibility administrators assume for instruction in three areas

(b) teachers' estimates of responsibility administrators assume for program planning

IV. Schoolwide Coordination of Instructional Programs:

*(a) combined teachers' and principals' reports of the extent to which instructional programs are coordinated schoolwide

V. Administrative Policies Concerning Academic Standards:

*(a) principals' reports of whether any students were repeating a grade

(b) principals' reports of administrators' attitudes toward relaxing standards for low-achieving students

CORRELATIONS (r_s)**

	*I-a	*II-a	II-b	*III-a	III-b	*IV-a	*V-a
*II-a	.41						
II-b	.34	.14					
*III-a	.22	.14	.13				
III-b	0	.34	.13	***			
*IV-a	.32	.45	.21	.10	.28		
*V-a	.34	.11	.42	.49	.29	.24	
V-b	.33	.34	.30	0	.15	0	.23

*Asterisks designate indicators used in constructing indices of administrative leadership in instruction and effective school management.

**Correlations in the negligible range are reported as 0.

***The very strong correlation between III-a and III-b is an artifact of index construction and therefore omitted.

Index scores of 0 through 5 represent the number of indicators on which a school scored high. Table III-5 shows the distribution of these scores in relation to school success/nonsuccess. Readers may particularly wish to compare the average score in successful schools (3.9) with the average in nonsuccessful schools (1.5). The difference is significant: successful schools were significantly more likely to be characterized by principal leadership in

Table III-5. Student Achievement and Effective School Management

ACHIEVEMENT

Combined Reading/Math

Number of Schools

SCHOOL MANAGEMENT INDEX SCORES	Nonsuccessful	Successful
0	3	None
1	2	1
2	7	None
3	1	2
4	None	2
5	None	4
Total =	13	9

$\alpha < .001$

	Nonsuccessful	Successful
MEAN SCORE	1.5	3.9

SIGNIFICANCE level was determined with a one tailed t-test.

SCORES ranging from 0 to 5 indicate least through most effective school management, respectively.

instruction, coordinated instructional programs, and an emphasis on academic standards.

The associations among these five dimensions of school organization indicated that these findings could all be subsumed under administrative leadership in instruction. For example, principals who felt strongly about instruction tended to oppose the relaxing of standards for low-achieving students (r_s = .33); schools where principals communicated their views by regularly reviewing and discussing teaching performance with teachers tended to have well-coordinated instructional programs (r_s = .45); and principals who took responsibility for decisions concerning instruction tended to have failing students repeat grades (r_s = .49). While to summarize these findings as administrative leadership in instruction does not seem unreasonable, we have refrained from doing so because we wish to single out and underscore the findings on "coordinated instructional programs" and "emphasis on academic standards," which are new to the 1975-76 in-depth study. In addition, although related to leadership, the two new findings are less abstract than leadership and tell us more precisely what is actually being done in successful schools.

One specifically operational activity engaged in by successful schools merits additional comment. This is the regular review and discussion of teaching performance. We have already suggested that it exemplifies two somewhat more abstract aspects of school management: communication about instruction and application of academic standards. The associations of review and discussion of teaching with other aspects of school management, shown below in Table III-6, lead us to consider how it may exemplify these as well. That is, regular review and discussion of teaching may be the evidence used by teachers to determine the principal's commitment to instruction; it may be the basis of their estimates of how much responsibility for instruction administrators assume; and it may be a means of coordinating instructional programs throughout the school.

Table III-6. Correlations Between Regular Review and Discussion of Teaching Performance and Other Aspects of School Management

● Teaching performance is regularly reviewed and discussed.		
r_s	α	
.41	.03	● The principal feels strongly about instruction.
.34	.06	● Administrators assume more responsibility for program planning.
.45	.02	● Instructional programs are coordinated school-wide.

CORRELATION COEFFICIENTS are Spearman rank correlation coefficients. Tests for significance were one-tailed.

One principal of a successful school volunteered a more detailed account of how teachers were informed of their teaching performance at his school, which illustrates the relationships among these indicators. Although this principal was actively involved in the review process, he emphasized that teachers also reviewed one anothers' work regularly and frequently. An important consequence, he felt, was greater teamwork among staff. That is, by reviewing each others' work, teachers also coordinated instruction more effectively throughout the school.

The finding that regular review and discussion of teaching performance is related to student achievement stands out among the other findings in three respects. One is simply that the relationship is stronger than any other ($\alpha < .003$). Second, regular review and discussion of teaching may be said to embody all five of the general aspects of school management that have been examined in this chapter. Third, by virtue of being specific and concrete, it is an action that may be readily adopted by school staff seeking to raise student achievement.

SUMMARY

The major question addressed in this chapter was:

- How does school organization and management differ in successful and nonsuccessful schools?

In-depth schools that succeeded in raising student achievement were characterized by administrative leadership in instruction, confirming the major school organization finding of the 1974-75 in-depth study. Effective administrators felt strongly about instruction and assumed relatively more responsibility for instruction-related tasks such as selecting basic instructional materials and planning and evaluating programs for the entire school. These leadership qualities were recognized and reported by teachers, which no doubt reflects the fact that effective administrators also communicated their views concerning instruction to teachers. One means of communicating especially prevalent in successful schools was regular review and discussion with teachers about their classroom performance. Communication may also have served to coordinate instructional programs throughout the school. Extensively coordinated programs also distinguished successful schools from nonsuccessful ones. Finally, we found that administrators in successful schools emphasized academic standards by reviewing teaching performance, by opposing the postponement of basic skills instruction, and by requiring students to repeat grades when standards for achievement were not met.

An answer to our question concerning effective school organization and management may be given in terms of five dimensions that appeared to differentiate successful from nonsuccessful schools. In successful schools, administrators:

- were more concerned with instruction;
- communicated their views about instruction;
- took responsibility for decisions relating to instruction;
- coordinated instructional programs; and
- emphasized academic standards.

CHAPTER IV

READING AND MATH INSTRUCTIONAL PRACTICES

This chapter describes the results of the analyses of reading and math instructional practices and related teacher attitudes. The objective of the analyses was to describe how differences in teacher practices and attitudes were related to student achievement. Data used in these analyses were derived from observations of teachers' and students' behavior in the classroom, interviews with teachers, and questionnaires completed by teachers.

While this inquiry focuses on hypotheses suggested by results from the 1974-75 ESAA In-Depth Study, the second in-depth study analysis differs from the first in one important respect. Whereas the 1974-75 analysis examined relationships at the school level, the 1975-76 analysis of instructional practices was conducted at the class level.* Class-level analysis has two principal advantages. The first is that teacher effects are preserved--one need not assume that students receive the same (or very similar) instruction throughout a given school. If instruction differs substantially from one classroom to another, a class-level analysis allows for examination of the effects of different instructional approaches. A second advantage is larger sample size.** The larger the sample, the greater the probability of detecting associations between variables.

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*The separate reading and math achievement gain measures are class averages, computed for those ESAA sample students receiving all of their reading or math instruction from a particular teacher. Gain scores were standardized by grade.

**Though actual numbers varied because of missing data, the class-level analyses for reading and math were conducted on as many as 105 and 98 classrooms, respectively, while school-level analyses were restricted to an N of 26.

The first-year in-depth study reported significant relationships between instructional practices and student achievement. These were formalized as a three-step model of effective instructional process shown below.

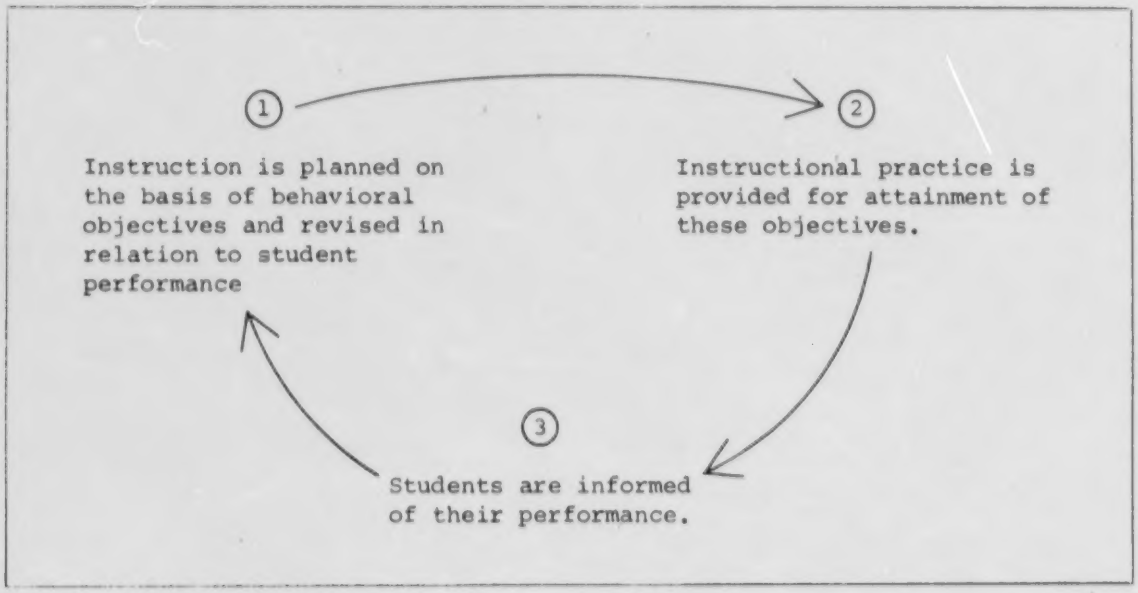
1
Instruction is planned on the basis of behavioral objectives and revised in relation to student performance
2
Instructional practice is provided for attainment of these objectives.
3
Students are informed of their performance.

Figure IV-1. Three-Step Model of the Instructional Process*

The model suggests that ESAA students in the in-depth schools learned best in a relatively structured environment. In a structured environment, according to the model, instruction is planned on the basis of behavioral objectives; students are given adequate practice time; and they are informed of how well they have met objectives. These results led us to focus on the following question in the present study:

- Are structured teaching practices associated with student achievement gains?

*Reproduced from the first-year report.

Because we thought structured teaching might result in achievement primarily by encouraging task-related behavior during practice and attention during instruction, we addressed a second question.

- Is student task-oriented behavior related to achievement gains? If so, do structured teaching practices lead to student task-oriented behavior?

Finally, we addressed a summary question concerning the explanatory power of the set of factors examined.

- What proportion of achievement gain is accounted for by structured teaching practices and student task-oriented behavior, combined?

ARE STRUCTURED TEACHING PRACTICES ASSOCIATED WITH STUDENT ACHIEVEMENT GAINS?

In assessing the evidence on this question, we began with variables that were components of the instructional process model (see Figure IV-1). These variables concerned:

- teachers' use of behavioral objectives;
- adequacy of practice; and
- feedback provided to students by teachers.

Use of objectives was assessed by whether teachers kept records of individual student learning objectives and by the importance given by teachers to behavioral objectives in various subjects. Adequacy of practice was assessed by observer judgments of the proportion of the lesson period devoted to practice. Feedback was estimated through teacher attitudes concerning the importance of providing feedback, teachers' reports of their actual use of feedback, and observations of teachers' feedback to students who were called on in class.

In addition to the variables that had predicted school success in the first in-depth study, several new measures of structured teaching were included in the 1975-76 study. Observational measures were used to assess:

- teacher efforts to convey an understanding of objectives by providing an overview of the lesson or by explaining the relationship of the day's lesson to previously studied material;
- teacher monitoring of students during lessons and practice periods; and
- teacher task orientation during lessons; that is, the extent to which teachers had observable objectives and returned to them when diverted.

We think that each of these variables is conceptually related to structure: teacher use of overviews and efforts to place the day's lesson in the context of an ongoing course of instruction are evidence of a sequence of organized instructional objectives; task-orientation also indicates a set of objectives and probably is essential to effective teaching; and teacher monitoring of student progress is, of course, a prerequisite for meaningful feedback.

Another variable related to structure and new to the 1975-76 study was examined: the importance of academic standards. We thought that teachers' standards would be evidenced both in what they demanded of students and in how they evaluated students' work. To assess teacher standards for student academic performance, a questionnaire item was used to find out if teachers believed in:

- finding ways to challenge the student even when this runs some risk of setting goals that the student cannot meet at present;
- rewarding the student only for the acquisition of specific academic skills and achievements.

Teachers rated the importance of each of these strategies on a scale of 1 to 5, least important through most important.

Although it seems to us that the teaching practices discussed above are conceptually related to structure, we found no empirical evidence of any common underlying factor. For instance, teachers who kept records of individual student goals might or might not be observed providing feedback to students ($r = .10$, NS).

In general, evidence that teachers used a structured approach of one kind did not imply that they used other practices consistent with a structured teaching approach. Instruction differed substantially from class to class, and attitudes differed from teacher to teacher, but not in any clearly systematic way. Consequently, we did not attempt to construct a single measure of structure as such: instead, we looked for relationships with student achievement separately for each of the variables described above.

Two instructional practices that are consistent with a structured approach were associated with student achievement gains in ESAA in-depth study classrooms: (1) although the relationship was weak, the more time students were given for practice, the greater their gains in reading achievement ($r = .17$, $\alpha = .05$); and (2) where teachers introduced lessons by relating them to earlier ones, students were significantly more likely to gain in math achievement ($r = .26$, $\alpha = .01$).

Since these two findings provided some evidence that structured teaching practices led to student achievement gains, we considered the possibility that the effects of certain instructional practices might be conditioned by the presence (or extent) of others. We were particularly interested in looking for these kinds of relationships because of a finding from the previous year's study.

In the previous year, we found that when teachers made extensive use of praise and other rewards, students had lower achievement gains. We knew, of course, that reinforcement could be used to raise student achievement, but that reinforcement effects depend upon the circumstances of reinforcement use. We hypothesized that reinforcement outcomes might depend upon teacher standards, and student learning would be greatest when teachers expected more from students and rewarded them primarily for satisfactory performance. The 1974-75 in-depth results indicated that some teachers might be using reinforcement to avoid confronting student performance problems. That is, teachers might be using praise to "encourage" low-achieving students <u>when they failed</u>, as well as when they succeeded.

In line with this reasoning, we looked at the relationship of positive reinforcement to student achievement when teachers held varying standards about use of reinforcement. We used a regression approach (described in C-1)* to determine that students had significantly higher math gains when their teachers praised and rewarded them frequently and favored the restriction of rewards to occasions when students made academic progress.

In similar fashion (i.e., using a regression approach described in C-2, and C-3), we examined the effect on student achievement when teachers combined an emphasis on each of the following pairs of variables:

- Standards and feedback to students
- Reinforcement and use of structured teaching methods
- Standards and use of structured teaching methods

The logical and philosophical compatibility between structured teaching and another general teaching strategy suggested investigation of a fourth pair of factors. Since many structured teaching practices are based on individually assessed learning objectives, we examined the relationship of:

- Individualization and structured teaching methods to student achievement.**

Individualization was assessed through observations of teachers' use of individualized learning objectives, materials, and pacing.

Among the combinations of variables described above, the following two appeared to have an impact on student achievement.

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*Parenthetical references--e.g., (C-1)--refer to tables containing supportive material that are found in Appendix C. Response distributions, scoring procedures, and other descriptive analyses are included.

**There was no significant simple relation between individualization and reading or math achievement gain.

TEACHER STANDARDS AND USE OF BEHAVIORAL OBJECTIVES

Students had significantly greater math gains when teachers used behavioral objectives and attached greater importance to setting challenging goals for disadvantaged students "even when this runs some risk of setting goals that the student cannot meet at present" ($\alpha = .01$) (C-2). We believe that this finding indicates that setting behavioral objectives may work best when those objectives are relatively difficult ones. Teachers who establish easy objectives so that their disadvantaged students can avoid failure, tend to have lower-achieving students.

INDIVIDUALIZATION AND USE OF BEHAVIORAL OBJECTIVES

Students whose teachers emphasized behavioral objectives and individualized instruction had significantly higher-than-expected math gains ($\alpha = .01$) (C-3). This finding suggests that individualized instruction may be especially effective when teachers establish clearly defined behavioral objectives.

IS STUDENT TASK-ORIENTED BEHAVIOR RELATED TO ACHIEVEMENT GAINS?

In examining the extent to which students' task-oriented behavior was associated with achievement gains, we found a low, but significant and positive association between observer ratings of student task-related behavior and math gain ($r = .23$, $\alpha = .01$). We found, also, that two structured teaching practices were related to student task-related behavior: teacher task-orientation and teacher monitoring of students (C-4).

Teachers who were task-oriented and who monitored student behavior during lesson and practice periods were significantly more likely to have task-oriented students as well ($r = .55$, $\alpha = .001$ and $r = .34$, $\alpha = .001$, for teacher task orientation and monitoring, respectively). Teachers' use of harsh criticism and ridicule was also related to student task-related behavior. The less teachers behaved in these negative ways, the more students were observed to engage in task-related behavior ($r = .57$, $\alpha = .001$). Where

teachers monitored students, avoided harsh criticism, and were themselves task-oriented, students were most likely to be engaged in work-related activities.* We believe these findings can be interpreted as evidence that teaching practices can have an impact on student behavior that is related to mathematics achievement gains.

Table IV-1 summarizes the results reported so far. The table displays the significant associations of variables related to reading and math achievement gain.

WHAT PROPORTION OF ACHIEVEMENT GAIN IS ACCOUNTED FOR BY STRUCTURED TEACHING PRACTICES AND STUDENT TASK-ORIENTED BEHAVIOR?

Finally, we examined how well the set of factors reported here predicted differences in class-level reading and math achievement gains. To answer that question, we looked at the conditions where pairs of teaching practices combined to produce higher-than-expected achievement gains, i.e., conditions of high standards and reinforcement, high standards and emphasis on use of behavioral objectives, and emphasis on behavioral objectives and on individualization. These conditions plus the two other variables that were related to math achievement gain (introductions of lesson material in terms of the previous day's lesson, and student task-oriented behavior) together accounted for 25 percent of the observed variance in class-level math achievement gain.** However, very little of the variation in reading gains could be predicted by these factors. Only practice time was significantly related to reading gain ($r = .17$, $\alpha = .05$), accounting for about three percent of the observed variation in reading achievement gains.

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*The multiple correlation of these three teaching practices with student task-oriented behavior was .70, indicating that about 50 percent of the variation in student behavior could be explained by these teaching practices.

**We used the technique of multiple regression to construct a prediction equation for mathematics gain, using variables representing the pairs of teaching practices, plus student task-oriented behavior and teacher use of introductions which related the day's lesson to the previous day's lesson. Each of these predictors was included because of its significant zero-order correlation with class-level math gain. The resulting regression equation explains a significant proportion of the variance in math gain, though the contributions of the individual predictors are not all significant at the .05 level.

Table IV-1. Variables Related to Class-Level Achievement Gain

MATH		
Variable	Pearson's Correlation Coefficient	α
Day's lesson is introduced in relation to previous lessons	.26	.01
Use of positive reinforcement and beliefs favorable to use of reinforcers for academic progress	.31	.01
Setting challenging goals and use of behavioral objective	.23	.01
Individualization and use of objectives	.26	.01
Student task-oriented behavior	.23	.01
READING		
Variable	Pearson's Correlation Coefficient	α
Practice time	.17	.05

SUMMARY

This chapter addressed three questions:

- Are structured teaching practices associated with student achievement gains?
- Is student task-oriented behavior related to achievement gains? If so, do structured teaching practices lead to student task-oriented behavior?
- What proportion of achievement gain is accounted for by structured teaching practices and student task-oriented behavior combined?

The first question was suggested by last year's study findings, which had led us to expect a relatively simple positive relation between structured teaching and achievement gain. We anticipated that various structured teaching methods would be positively related to one another and to reading and mathematics gain. We did find that when teachers introduced the lesson by placing it in the context of previously learned material, there was a moderate and positive significant relation with math gain. We also found a low and positive significant relation between practice time and reading achievement gain. There were three low-to-moderate significant associations between pairs of structured teaching practices and mathematics gain. Student gains in math achievement were higher

- when teachers praised and rewarded students frequently and were more favorable to restricting rewards to occasions when students made academic progress;
- when teachers used behavioral objectives and attached importance to setting challenging goals; and
- when teachers emphasized behavioral objectives and individualized instruction.

Based on these results, we infer that there are relations between structured teaching and reading and math achievement, but that these relations are fairly complex.

We asked our second question because we thought that certain structured teaching practices might affect student learning primarily because of their impact on student attention during instruction and on task-orientation during practice periods. We found a low significant positive relation between student task-related behavior and mathematics gain. Three teaching practices--teacher task-oriented behavior, teacher avoidance of harsh discipline, and monitoring of students--had moderate-to-substantial positive associations with student task-oriented behavior. We take these results as evidence that the more teachers structure their instruction, the more students are task-oriented, and the more students are task-oriented, the greater their gains in achievement.

In answer to our final question, we found that the total set of factors examined account for approximately 25 percent of the class-level variation in math and 3 percent of the class-level variation in reading achievement gain.

CHAPTER V

SCHOOL RESOURCE USE AND RESOURCE COSTS

The primary focus of the 1975-76 resource cost analysis was to attempt to replicate last year's findings. In 1974-75 we found that while successful schools had higher total reading and math per-pupil resource costs than nonsuccessful schools, these differences were not statistically significant. However, two specific relationships were found to be statistically significant: (1) more remedial math specialists were used in successful schools, and (2) more instructional aides in math instruction were used in nonsuccessful schools. This year we were especially interested in determining whether or not the relationships between achievement gains and the use of remedial specialists and instructional aides held up. In addition, we expanded this year's resource cost analysis to include two other areas of resource use analysis. The first area was the time school principals and regular classroom teachers devoted to curriculum development, needs assessment, program planning, program evaluation, and professional development activities. Last year we had examined teacher participation in inservice training, but not principal participation. Findings from our analysis of principal leadership suggested that both teacher and principal involvement in curriculum development, program planning, and program evaluation might be important. The second new area included in this year's analysis was the relationship between achievement gains and the manner in which school administrators used certain resources.

Given the above orientation to this year's resource cost analysis, the following questions are examined in this chapter:

- Does the level of resource use make a difference in academic achievement?
- Does the way resources are used make a difference in academic achievement?

An overview of the procedures we used to answer these questions is presented in the following paragraphs, followed by the results of the analysis and a discussion of the major findings. A more detailed account of the methodology used in the resource cost analysis can be found in Appendix D.

The approach we used in this study attempts to measure the actual use or allocation of resources within the school and classroom. This is very different from an approach that uses school-district expenditure data to measure school resources. The expenditure approach often used in educational cost-effectiveness studies relies primarily on financial data from school district accounting records. Expenditure data provides information on how much is spent in the school for each resource, but does not provide information on how resources are used in particular classes or particular instructional components. Because of this limitation of the expenditure approach, we used a resource allocation approach, in which we examined the amount and kind of resources used in instruction and then assigned an average cost per hour for each resource used.*

The resources with which we were primarily concerned in this study are those that bear on the development of curricula, the provision of services, and evaluation of reading and math instruction. These are:

a. Teaching Staff--Classroom teachers, reading specialists, math specialists, instructional aides, and media specialists.

b. Support Staff--Speech therapists and principals.

c. Equipment--Tape recorders, record players, projectors, controlled readers, System 80.

d. Staff Development--Inservice training for teachers and school principals.

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*For a general discussion of the resource allocation approach to program cost analysis, see S.A. Haggart, Program Cost Analysis in Educational Planning, The Rand Corporation, P-4744, December, 1971.

e. Program Development and Evaluation--Teacher and principal participation in reading and math program development and evaluation.

To collect resource-use data, two types of instruments were employed. The primary type of instrument was a set of self-administered questionnaires for teachers that included questions on the extent to which a teacher allocated time to reading and math instruction and used special instructional staff in the classroom. Teachers were also asked to provide data on their use of instructional equipment and materials, and on the amount of staff development training they received and the time they spent developing and evaluating new programs. School principals also completed a short questionnaire that asked them to indicate how much they participated in new program development and evaluation as well as in various types of staff development activities.

Different resources required different procedures to convert resource-use data into resource cost estimates. We calculated each regular teacher's cost for teaching reading or math by multiplying the proportion of time spent instructing students in reading or math by the average annual salary for a regular classroom teacher. Average annual salaries were calculated on the basis of actual salary data from districts participating in the in-depth study. Once we had calculated each teacher's reading and math resource costs, we summed these costs to determine the school's overall teacher costs for providing reading and math. We followed a similar procedure in calculating the costs of other staff associated with the reading or math programs in the school.

Costs associated with using instructional equipment and materials were calculated on the basis of an average annualized capital and operating cost for each resource. These cost factors were multiplied by the proportion of time each teacher used the resource in reading or math.

We estimated reading and math inservice training costs for teachers and principals by multiplying their hourly rates by the total hours of training received

in the past year. While this procedure did not take into consideration all associated training costs, it was the best estimating procedure available. A similar procedure was used to calculate costs associated with new program development and evaluation activities undertaken by school principals and teachers.

The procedures outlined above were used to develop reading and math program resource costs for the elementary schools in the in-depth study. In the following sections, the results from this analysis are presented and discussed.

DOES THE LEVEL OF RESOURCE-USE MAKE A DIFFERENCE?

An assumption on which our resource cost analysis was predicated is that the level of use of resources is more likely to influence reading and math achievement gains than the mere availability of resources. To test this assumption, we first analyzed the relationships between achievement gains and the simple availability of staff and other resources. These analyses produced neither consistent nor statistically significant relationships between resource availability and achievement gains. We then examined the relationships between academic achievement and the level of resource use in reading and math. To do this, we first classified schools as either successful or nonsuccessful on reading or math achievement, and then calculated for each group the mean per-pupil resource cost for each resource used.* T-tests were used to assess whether the differences between successful and nonsuccessful schools were statistically significant.

The data that we used to answer this question are standardized per-pupil resource costs. It should be remembered that these resource costs were derived from

*The focus of the analysis reported in this Chapter is on the 22 in-depth elementary schools that were classified as either successful or nonsuccessful in reading or math. The schools that were neither successful nor nonsuccessful, as defined earlier in this report, were excluded in these analyses.

combining data on the actual hours a particular resource (e.g., remedial specialist, etc.) was used within a school or classroom with an estimate of the average price for that resource. Hence, the resource cost estimates reported in this section reflect the actual level of resource use that occurred in the in-depth schools.

We examined the level of resource-use in two areas of activity in each school:

- Within-classroom resource use in reading and math instruction, and
- Resource use outside the classroom, in staff development and in planning and evaluating reading and math instructional programs.

READING AND MATH INSTRUCTION

In examining reading and math instruction, we were primarily interested in determining the use of staff rather than non-staff resources. Nearly all of the 22 schools used other instructional staff in addition to the regular classroom teacher. Remedial specialists and instructional aides were the most common supplementary staff providing reading or math instruction. Speech therapists and media specialists were also used, but less often. Generally, schools that used special supplementary personnel to assist regular teachers tended to use two or three different types of special personnel. However, the level of use of each type of supplementary personnel varied greatly, as indicated by the data in Tables V-1 and V-2.

A somewhat higher level of staff resource-use occurred in reading than in math instruction (see Tables V-1 and V-2). The total per-pupil resource cost for reading instruction averaged about $161. The same cost for math instruction was only $91, which is a difference of about $70 per pupil. This difference can be accounted for in several ways. One major difference occurred in the availability and use of remedial reading and math specialists. All but four of the twenty-two schools used remedial specialists in reading instruction, while just over half of the schools used remedial specialists in math instruction. This

Table V-1. Average Per-Pupil Reading Resource Costs for the 22 Elementary Schools Included in the Analyses of Achievement Gains

Resource	Mean	Median	Standard Deviation	Interquartile Range
Regular teachers	$ 66.90	$ 73.44	$15.81	$30.40 - $ 92.35
Remedial specialists	50.00	39.02	45.67	0.0 - 156.14
Instructional aides	24.90	23.78	20.81	0.0 - 65.87
Speech therapists	13.68	6.85	18.77	0.0 - 80.39
Media specialists	5.19	3.38	6.75	0.0 - 21.82
Instructional equipment	0.16	0.39	0.52	0.13 - 1.80
Totals	$160.83	$177.64	$75.23	$57.63 - $317.17

Table V-2. Average Per-Pupil Math Resource Costs for the 22 Elementary Schools Included in the Analyses of Achievement Gains

Resource	Mean	Median	Standard Deviation	Interquartile Range
Regular teachers	$46.31	$44.38	$ 8.64	$33.05 - $ 66.54
Remedial specialists	26.83	9.66	36.12	0.0 - 109.72
Instructional aides	17.14	3.27	25.98	0.0 - 82.21
Media specialists	0.68	0.04	1.53	0.0 - 6.23
Instructional equipment	0.19	0.18	0.14	0.0 - 0.56
Totals	$91.15	$60.28	$64.20	$33.88 - $227.77

difference in availability was also reflected in the amount of specialist time, for each type of specialist, that was allocated to classroom instruction: the 22 schools allocated almost twice as much remedial specialist time to reading instruction as to math instruction.

Different levels of use of other supplementary staff also contributed to the different per-pupil costs for reading and math instruction. Quite consistently, the use of instructional aides and media specialists was much greater for reading instruction than for math. In addition, regular classroom teachers typically devoted somewhat more time to reading than to math instruction, and, as expected, speech therapists were used to assist with reading instruction and not with math.

The data reported in Table V-3 suggest a partial answer to the question that is the focus of this section: Does the level of resource-use make a difference? As shown by the data, there was a clear tendency for the successful schools to have a higher per-pupil cost on each resource used in the provision of reading instruction than the group of nonsuccessful schools. Moreover, total reading resource cost averaged about $38 more for each student in successful schools than in nonsuccessful schools. None of these differences, however, were statistically significant.

These findings are generally consistent with last year's in-depth study results in several respects (Wellisch, 1976). First, last year's successful schools also had a slightly higher total per-pupil cost for reading resources than the nonsuccessful ones. Second, most of the differences in resource costs for reading instruction between successful and nonsuccessful schools were not statistically significant.

Table V-3. Average Per-Pupil Reading Resource Costs for Schools Ranked Successful and Nonsuccessful on Reading Achievement Gains*

Reading Resources	Average Per-Pupil Costs in Successful Schools (N=7)	Average Per-Pupil Costs in Nonsuccessful Schools (N=10)
Regular Teachers	$ 72.91	$ 62.86
Reading Specialists	48.59	41.74
Instructional Aides	29.44	19.72
Speech Therapists	18.06	9.68
Media Specialists	7.35	5.00
Equipment	0.53	0.46
Totals	$176.88	$139.46

*The rankings were based on national percentile change scores in reading for 1975-76.

Table V-4 compares resource costs for math instruction in schools showing math achievement gains with those not showing gains. The overall per-pupil resource costs were slightly higher among nonsuccessful schools; that is, the nonsuccessful group averaged about $14 more in total resource costs for math instruction. A substantial portion of these higher resource-use costs in nonsuccessful schools is accounted for by higher costs for math specialists and math instructional aides. However, none of the differences between successful and nonsuccessful schools is statistically significant.

These results differ somewhat from those of last year's in-depth study. While this year's total per-pupil math resource costs tended to be higher for nonsuccessful schools, the opposite result was found in last year's study. That

Table V-4. Average Per-Pupil Math Resource Costs for Schools Ranked Successful and Nonsuccessful on Math Achievement Gains*

Math Resources	Average Per-Pupil Costs in Successful Schools (N=6)	Average Per-Pupil Costs in Nonsuccessful Schools (N=8)
Regular Teachers	$42.55	$43.82
Math Specialists	17.25	21.10
Instructional Aides	6.74	16.11
Media Specialists	0.39	0.19
Equipment	0.14	0.13
Totals	$67.07	$81.35

*The rankings were based on national percentile change scores in math for 1975-76.

is, last year's successful schools had higher total per-pupil math resource costs. One very important difference between the two sets of results is in the relationship between remedial math specialist costs and math gains. Last year's study produced a statistically significant relationship between level of specialist costs and math gain, with the successful schools averaging substantially higher remedial specialist costs. This year's results indicate that nonsuccessful schools averaged slightly higher specialist costs, although the relationship is not statistically significant.

Lastly, this year's data indicate that average costs for instructional aides used in math was somewhat higher for nonsuccessful schools than for successful schools. This result is consistent with the direction of last year's data;

however, unlike last year's result, we did not find this relationship to be statistically significant this year.

PROFESSIONAL DEVELOPMENT AND PROGRAM PLANNING AND EVALUATION

The second major area of resource-use that was of interest to us this year was the level of participation by school principals and teachers in professional development training and in program development and evaluation.

Principal Participation in Professional Development and Program Planning and Evaluation

School principals varied fairly extensively in how much professional training they received during the past year. Six areas of staff development in which principals participated are listed in Table V-5. While some principals received as many as 25 hours of training during the year in several areas, others received only a few hours in one area. It should also be noted that if a principal received extensive staff development training in one area, it was very likely that he or she received similar (although not necessarily the same) amounts of training in some of the other areas. Such training presumably increased principals' capabilities to supervise, develop, and implement effective instructional programs within their schools.

As shown in Table V-5, successful schools had higher average resource costs in each of the six areas of staff development in which principals participated; that is, principals in successful schools spent more time in professional training activities. Three of these areas warrant special notice. Principals in schools successful in raising math achievement devoted significantly more time to staff development activities in the areas of:

- curriculum development for disadvantaged students;
- effective leadership techniques;
- program monitoring and evaluation procedures.

Table V-5. Average Resource Costs Associated with School Principals' Participation in Staff Development Activities for Schools Ranked as Successful and Nonsuccessful on Reading or Math Achievement

Type of Staff Development Training Received by Principal	Reading Achievement		Math Achievement	
	Successful Schools	Nonsuccessful Schools	Successful Schools	Nonsuccessful Schools
	(N=7)	(N=10)	(N=6)	(N=8)
Curriculum Development for Disadvantaged Students	$ 209.	$115.	$ 192.	$ 58.*
Leadership Techniques	220.	154.	231.	87.*
School-Community Relations	143.	115.	167.	88.
Needs Assessment Procedures	165.	100.	167.	77.
Program Planning Procedures	176.	138.	179.	87.
Program Monitoring and Evaluation Procedures	187.	131.	205.	87.*
Total	$1,100.	$753.	$1,141.	$484.*

*Difference between the means is significant at the .05 level.

Table V-5 also shows total resource costs across all six areas. Total costs were substantially greater for the successful schools than for the nonsuccessful schools. Schools that were ranked successful on the reading achievement variable had a total staff development training cost for principals of about $1,100 for the year, as compared to $753 for nonsuccessful schools. This is an average difference of about $347. Schools ranked successful on math achievement had a total resource cost of about $1,141, as compared to $484 for nonsuccessful schools--a difference of about $657. This difference is statistically significant at the .05 level.

The extent to which principals devoted time to actual program development and evaluation activities was also examined. The differences between successful and nonsuccessful schools on reading and math achievement are presented in Table V-6. Principals in successful schools, on the average, devoted more time to developing new curriculum and to assessing programs than those in nonsuccessful schools. The principal resource costs for math needs assessment, program planning, and program evaluation in schools that were successful on math achievement were significantly greater (at the .05 level) than for nonsuccessful schools.

Teacher Participation in Professional Development and Program Planning and Evaluation

Participation by regular classroom teachers in inservice training and new program development and evaluation was also examined for relationships with achievement gains. Inservice training in reading and math instructional techniques and practices and instruction for disadvantaged students were examined. The results of this analysis are somewhat mixed, and diverge in part from our findings concerning the participation of school principals in similar activities. Although per-pupil inservice training costs were somewhat higher for teachers in successful schools than in nonsuccessful schools, these differences were not statistically significant. In last year's in-depth study we found that nonsuccessful schools had higher per-pupil inservice costs than successful schools, but these differences, like this year's results, were not significant.

Table V-6. Average Resource Costs Associated with School Principals' Participation in Program Development Activities for Schools Ranked as Successful and Nonsuccessful on Reading or Math Achievement

Type of Program Development Activity	Reading Achievement		Math Achievement	
	Successful Schools	Nonsuccessful Schools	Successful Schools	Nonsuccessful Schools
	(N=7)	(N=10)	(N=6)	(N=8)
Reading (or Math) Needs Assessment, Program Planning, and Evaluation	$219.	$200.	$256.	$154.*
Development of New Reading (or Math) Curriculum	285.	177.	256.	144.

*Difference between the means is significant at the .05 level.

The per-pupil resource costs associated with regular teacher participation in reading and math curriculum development and program evaluation were somewhat higher for the nonsuccessful schools. Indeed, the teacher resource costs associated with math curriculum development and math program assessment were significantly greater (at the .05 level) for the nonsuccessful schools. These results are opposite to those found when principal resource costs associated with math program development efforts were related to math achievement gains. It seems, on the basis of these results, that the more school principals were involved in program planning, development, and evaluation, the more likely a school would be classified as successful on math achievement. On the other hand, higher teacher involvement in program development and evaluation efforts seemed to be associated with less success on math achievement.

The data reported in this section suggest a tentative answer to one of the central questions on the in-depth resource cost analysis: Does the level of resource-use make a difference? In analyzing the per-pupil resource costs for the provision of reading and math instruction in our 22 elementary schools, it seems fairly clear that the level of resource-use for the resources that were examined is not consistently related to reading and math achievement gains. However, one area of resource-use that does seem to be related to reading and math achievement gains is the involvement of school principals in program planning, development, and evaluation as well as their participation in staff development training for themselves. Quite consistently, the successful schools had higher average resource costs for these activities. Several of these relationships were statistically significant.

DOES THE WAY RESOURCES ARE USED MAKE A DIFFERENCE IN ACHIEVEMENT?

In asking this question, we were interested in moving beyond the assessment of the relationship between the level of resource-use and academic gains into the area of how different types of staff resources were used within the school setting. The results of two years of in-depth study suggest that neither simple availability of resources nor the amount of all resources used within schools

seems to be consistently related to academic performance. Given that instructional resources can be used in many different ways, it seemed reasonable to try to assess the relationship between the manner in which resources were used and school performance. This assessment encompasses the following two components:

- The versatility with which remedial specialists were used in providing reading or math instruction.
- The extent to which school adiminstrators contributed to an environment of professional development.

HOW REMEDIAL SPECIALISTS WERE USED

School principals were asked to provide information on the different ways remedial specialists were used in their schools' reading and math programs. Principals were given the following four response options for reading and for math:

- Students are assigned on a regular basis to the specialist.
- The specialist can be called to come in and help out in reading or math classes.
- Students can be sent to the specialist at any time.
- The specialist confers with teachers on instructional methods and materials on a regular basis.

The last three options were intercorrelated, and were used to create a scale to assess whether or not versatile use of remedial specialists was related to academic performance. Scale values ranged from zero to 3, with a value of 3 indicating that a school used remedial specialists in all three ways.

When we related the scale values to reading and math gains, we found that successful schools typically used remedial specialists with greater versatility than nonsuccessful schools. This was found to be the case for both reading

and math instruction, with the result for math being statistically significant at the .05 level. One possible interpretation of this result is that schools with higher academic performance recognized that their ESAA students varied in their academic needs and hence responded to those needs by using remedial specialists flexibly.

PROMOTION OF AN ENVIRONMENT OF PROFESSIONAL DEVELOPMENT

In an earlier section of this chapter it was reported that no relationship was found between the amount of inservice training teachers received and student academic performance. Given this result, we wanted to assess whether or not schools differed in the extent to which professional development was encouraged within the school. To assess this qualitative aspect of professional development, school principals were asked to indicate how often the schools:

- Gave teachers leave to attend professional meetings;
- Helped to defray expenses for meetings or courses;
- Provided weekend courses;
- Subscribed to educational journals;
- Provided inservice training courses; and
- Provided summer courses.

Schools that engaged in several of these activities several times during the year were viewed as stressing professional development among staff members more than schools that seldom, if ever, provided such activities.

By combining the responses to the above items into a scale, we were able to assess whether or not schools varied on this aspect of staff development and, if so, how that variation related to academic performance. Scale values ranged from zero to 6; values of 4 to 6 were viewed as an indication that professional development was strongly emphasized by school administrators.

When scale values were related to student gains, it was found that successful schools typically stressed professional development more than nonsuccessful schools. The relationship between reading gains and the emphasis placed on professional development was significant at the .08 level. This result suggests that successful schools encouraged the development of an environment for their instructional staff that stressed professionalism and the pursuit of a variety of training experiences designed to improve the quality of instruction.

Although the scope of these analyses is narrow, the results reported suggest a tentative answer to the question: Does the way resources are used make a difference in achievement? It seems fairly clear that schools that used remedial specialists in a flexible and versatile manner were likely to have higher achievement gains than schools that did not use specialists or used them in a circumscribed way. Moreover, schools that encouraged professional development and continued improvement in the quality of teaching staff through training activities were more likely to experience high performance gains. These results suggest that the way in which resources are used can influence how well schools perform in reading and math.

SUMMARY AND CONCLUSION

This chapter focused on two major questions:

- Does the level of resource-use make a difference in academic achievement?
- Does the way resources are used make a difference in academic achievement?

The resource cost data reported in this chapter indicate that there was no statistically significant relationship between academic performance and the level of resource-use in reading and math instruction within the 22 in-depth schools. We had hoped to replicate the positive relationship found in last year's study between the use of remedial math specialists and math gains, and

the negative relationship between the use of instructional aides and math gains. We did not find this year that these variables related to math or reading gains, although successful schools tended to have slightly higher reading resource costs than nonsuccessful schools.*

We did find that principals in the schools that were successful in math achievement devoted more time to acquiring additional training through staff development activities than principals in nonsuccessful schools. Moreover, a fairly active role in program planning and evaluation by the principal was found to be related to higher math performance. However, the level of participation by teachers in staff development activities was not related to school performance, although we did find a negative relationship between math gains and level of participation by teachers in curriculum development and program assessment. (Within schools that were successful in math, teachers devoted less time to curriculum development and program assessment.)

We also found that the way resources were used in the in-depth schools was related to math academic performance. The more successful schools used remedial math specialists with greater versatility than nonsuccessful schools. Moreover, successful schools tended to place more emphasis on participation in staff development activities than nonsuccessful schools. These results suggest that successful schools attempted to maintain a flexible approach to the use of remedial specialists and to create an environment of professionalism and continuous development of professional skills and capabilities.

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*We also analyzed expenditure data on the 22 in-depth schools; these data were collected from district business managers as part of the larger ESAA evaluation. We were interested in determining whether or not the successful/nonsuccessful groupings had different levels of budgeted per-pupil expenditures. Consistent with our reading and math resource cost results, we found no relationships between level of expenditures and school performance.

CHAPTER VI

EQUALITY OF EDUCATIONAL OPPORTUNITY

One of the objectives of the ESAA Grants Program is to identify and meet "... the needs incident to the elimination of minority-group segregation and discrimination...." This objective has made equality of educational opportunity (EEO) an important outcome measure in the evaluation of the Emergency School Aid Act. This chapter reports the results obtained from an in-depth look at EEO in 26 ESAA elementary schools.

The questions addressed in this chapter were designed to explicate the findings of the 1974-75 study. In that study we found substantial variability among the schools in the extent to which they provided equality of educational opportunity. Our results indicated that the EEO climate in the schools was related to teachers' and principals' commitment to a policy regarding EEO. We found that students were less likely to show gains on the Teacher-Student Interaction Scale of the School Climate Questionnaire when teachers showed a disproportionate amount of negative behavior toward minority students; also, students in schools where teachers' behavior was biased were less likely to show achievement gains in reading.

The student population in 1975-76 in-depth elementary schools was largely minority; the minority population was largely Black. Table VI-1 reports the racial composition of in-depth study schools. Some schools were in districts that had been awarded Basic ESAA grants and had desegregated, or were in the process of desegregating, or were planning to desegregate. Other schools were in districts that had received Pilot ESAA grants, and were not desegregating.

As in the first year of the in-depth study, certain questions could be asked only of desegregated schools. Questions about differences in treatment of Anglo and minority students and about intergroup interaction were restricted to those 17 elementary schools where fewer than 90 percent of the students

were of a single racial/ethnic group. On the other hand, we did inquire about the amount of cultural enrichment materials in all 26 elementary schools, because we felt that the availability of such materials was relevant to the equality of educational opportunity offered to both Anglo and minority students in schools of any racial composition.

Table IV-1. Racial/Ethnic Composition of Schools Selected for In-Depth Study

	Percentage Minority Enrollment*					
	0-10%	11-30%	31-50%	51-70%	71-90%	91-100%
Number of Schools (N=26)	1	4	5	2	6	8

*Two schools reported a non-Black minority greater than five percent; these had enrollments of eight percent and forty-five percent Hispanic background.

This chapter focuses on questions asked at three levels: the school, the classroom, and the student. The questions are:

- To what extent do schools emphasize EEO-related activities and practices? Do schools engaging in one EEO-related activity tend to engage in others? What factors might account for differences in school emphasis on EEO?

- What is the relationship between school emphasis on EEO-related activities and teacher behavior toward minority and non-minority students?

- Do school and teacher practices have an impact on students? Is there an impact on how students interact with one another; on how students perceive the treatment they receive from teachers; and on school success in raising student achievement?

TO WHAT EXTENT DO IN-DEPTH SCHOOLS EMPHASIZE ACTIVITIES AND PRACTICES RELATED TO EQUALITY OF EDUCATIONAL OPPORTUNITY?

To assess the amount of emphasis placed by schools on equality of educational opportunity, we looked at efforts to provide students with information about minority cultures, to show minority persons in non-stereotyped roles, and to promote intergroup relations either through ensuring racial/ethnic balance in school classrooms or through special educational programs.

We used six indicators* to measure school emphasis on equality of educational opportunity:

- Time devoted by principals to EEO-related school activities
- Minorities in school displays
- Minorities in textbooks and supplemental reading material
- School assemblies with cultural enrichment/intergroup relations themes
- Library material on cultural enrichment/intergroup relations
- Racial/ethnic balance of classrooms

We felt that all but the last of these indicators was relevant both in desegregated and in majority- or minority-impacted schools.

TIME DEVOTED BY PRINCIPAL TO EEO-RELATED ACTIVITIES

We took the total number of hours that principals estimated they would spend during the school year to plan, develop, and evaluate cultural enrichment/intergroup relations programs as an indicator of the importance that principals

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*The inter-item correlations of these indicators are shown in Table VI-2. The items and procedures used in constructing these indicators are reported in Appendix E.

assigned to this aspect of the school's program. There was considerable variation in principal responses. While approximately half of the principals indicated that they would spend from one to twenty hours in this activity, four principals expected to spend no time and three planned to spend more than forty hours in EEO-related activities.

MINORITY MATERIALS IN SCHOOL DISPLAYS

To assess school efforts to counteract racial/ethnic stereotypes, school displays were examined for how minorities were portrayed. Eighteen schools had displays that included minority persons. In those 18 schools we asked observers to determine whether these displays depicted minority persons (1) in high-status positions as often as Anglos, (2) as central characters as often as Anglos and, (3) in the same action context as Anglos.

We constructed a school display index by taking the mean of code scores for each type of assessment. Schools where displays showed no minority persons were coded 1; those where displays showed minorities, but less favorably than Anglos, were coded 2; and those where minorities were shown in positive ways were coded 3. For all three types of assessments, observers reported that about half of the schools used displays in a manner that might counteract racial/ethnic stereotypes.

MINORITIES IN TEXTBOOKS AND SUPPLEMENTAL READING MATERIALS

Textbooks and supplemental reading materials were examined to determine whether minority persons were included and, if so, how they were portrayed. Where textbooks portrayed persons whose racial/ethnic identity was apparent, about one-third showed minorities as favorably as Anglos, that is, as central characters and in high-status positions. Most reports (82%) showed minorities and Anglos in the same action context. In addition, observations of action context had low correlations with those concerning status and centrality. As a consequence, our reading materials index excluded observations concerning action contexts; it was

composed of observations on minority social status and centrality. Schools varied from those in which approximately 70 percent of the materials examined showed minorities favorably, to those in which only 10 percent of the materials did so.

SCHOOL ASSEMBLIES WITH CULTURAL ENRICHMENT/INTERGROUP RELATIONS THEMES

A fourth measure of school emphasis on EEO used the number of assemblies held during the year that featured minority heritage of intergroup relations as a major theme. Nine schools reported assemblies of this type. One school sponsored twenty and eight schools had from one to six assemblies with cultural enrichment or intergroup relations themes. The remaining 17 schools had no assemblies of this type.

LIBRARY MATERIAL ON CULTURAL ENRICHMENT/INTERGROUP RELATIONS

We constructed a fifth index of school emphasis on cultural enrichment/intergroup relations from the number of library listings in 23 subject areas ranging from Africa, American Indians, and Asia to Race Relations, Segregation, and Slavery. In-depth schools had from 0 to 318 listings of such materials. The average number of listings in these subject areas was 114. We took total listings as an index of the availability of this subject matter.

RACIAL/ETHNIC BALANCE OF CLASSROOMS

One method of increasing opportunities for intergroup interaction in desegregated schools is for administrators to ensure racial/ethnic mix in school classrooms.* We created an index of the degree of mix as an indication of whether administrators might have been making such an effort in the in-depth schools. The index summarizes the degree of racial balance in classrooms throughout the school.

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*For the purposes of this study, desegregated schools are those in which fewer than 90% of the students are of a single ethnic group.

We did find individual classrooms in which the proportions of Anglo and minority students were significantly different from the grade-level proportions,* but there were no schools in which the overall pattern of classroom assignment was unbalanced. Although we did not identify schools with consistent evidence of non-random class assignment, our index is of interest because it ranks schools according to the extent to which classroom assignment practices increase opportunities for racial/ethnic interaction. We inferred that where classroom composition closely approximated the overall composition throughout the school, administrators had made decisions that ensured such a mix. In many schools this would have involved the rejection of student ability grouping as a criterion for class assignment.**

ARE SCHOOL ACTIVITIES AND PRACTICES CONCERNING EEO RELATED TO EACH OTHER?

We were interested in the extent to which school activities and practices concerning EEO were related to one another, because a set of positive relationships would be evidence that schools tended to make policy decisions either to emphasize or not to emphasize equality of educational opportunity. Table VI-2 shows the correlations among the six indicators described in the preceding sections. Although most of the correlations were moderate, they were sufficiently strong to warrant the conclusion that where equality of educational opportunity was promoted in one way, it tended to be promoted in other ways as well.

In addition, the variation common to the items warranted the construction of a scale, the Cultural Enrichment Activities Index (CEA), to provide an overall measure of school emphasis on EEO. Scale scores were obtained by taking the

*Proportions in 9 of the 76 classrooms (12%) in 14 desegregated elementary schools differed significantly from grade-level proportions. Three desegregated schools had fewer than three classrooms with valid student ethnic data and were excluded from this analysis.

**This should serve as a cautionary note. Schools may employ practices that reduce opportunity for intergroup contact without that being their intention. The presence of segregated classrooms in desegregated schools is insufficient ground for inferences about particular administrator motivations.

Table IV-2. Correlations of Indicators of School Emphasis on Equality of Educational Opportunity

	Principal Emphasis on EEO	Multi-Ethnic School Displays	Multi-Ethnic Reading Materials	School Assemblies	Library Material	Racial/Ethnic Classroom Balance
Principal Emphasis on Cultural Enrichment/ Intergroup Relations Activities	1					
Use of Multi-Ethnic Materials in School Displays	.28 (25)*	1				
Use of Multi-Ethnic Reading Materials	.23 (25)	.34[a] (25)	1			
Number of School Assemblies with Cultural Enrichment/ Intergroup Relations Themes	.41[a] (23)	.32 (23)	.41[a] (23)	1		
Amount of Library Material on Cultural Enrichment/ Intergroup Relations Themes	.32 (24)	.34[a] (24)	.18 (24)	.38[a] (22)	1	
Racial/Ethnic Classroom Balance	.24 (14)	.51[a] (14)	-.09 (14)	.38 (13)	.41 (13)	1

*Parentheses show the number of schools on which correlation is based.

[a]Significant at the .05 level.

mean of values assigned to the six indicators (3, 2, or 1 for high, medium, or low categories, respectively).* As shown in Table VI-3, the resulting scale had possible and actual scores ranging from 1 to 3. To illustrate the meaning of the scores shown in the table, consider that a score of 2.5 would have occurred if a school scored high on half the indicators and medium on the other half. The two schools obtaining scores of 2.5 or higher strongly emphasized equality of educational opportunity. Six schools obtained scores of 1.4 or less, indicating they emphasized equality of educational opportunity very little. The remaining 17 schools were spread evenly across the mid-range of scores (1.5 to 2.4), indicating moderate degrees of emphasis on EEO.

Table VI-3. Frequency Distribution of Cultural Enrichment Activities Index

Scale Score	Number of Schools
1.0 to 1.4	6
1.5 to 1.9	9
2.0 to 2.4	8
2.5 to 3.0	2
Insufficient data	1
Total	26

WHAT FACTORS MIGHT ACCOUNT FOR VARIATIONS IN SCHOOL EMPHASIS ON CULTURAL ENRICHMENT/INTERGROUP RELATIONS?

We examined seven factors that we felt might be responsible for differences in school emphasis on cultural enrichment/intergroup relations activities:

- Ethnic composition of the teaching staff
- Teachers' attitudes about the importance of improving intergroup relations**

*The categories high, medium, and low refer to the schools in our sample. We have no way of knowing how our schools rank relative to schools in general.

**We also examined the relation of the CEA to a measure of the importance that principals attach to "implementing inter-cultural curricula." The response distribution for that item was so highly skewed that we can attach no importance to the finding that these two measures were unrelated ($r = -.14$, NS).

- Treatment/control status of the school
- Budgeted expenditures for "cultural heritage/intergroup relations programs"
- Proportion of minority enrollment
- Principal's ethnicity
- Pilot/Basic status of the school

The first three of these factors were unrelated to the CEA index. We had been interested in teacher attitudes and characteristics because we thought that teachers might have an important role in determining school programs. We were interested in treatment/control status because the ESAA program provides funds for "cultural heritage or intergroup relations programs." However, treatment/control status of in-depth schools was not related to the CEA scale.

In fact, only three in-depth schools indicated that they had funds for cultural heritage or intergroup relations programs. All three schools ranked above the mean on the CEA scale. Their scale scores and total expenditures were consistently ordered (2.4, $2000; 2.3, $850; and 2.2, $97). However, budgeted figures may not accurately reflect actual expenditures, since many cultural enrichment activities may be supported by funds not specifically designated for this purpose. School displays, principal resource time, library materials, and school assemblies all involve expenditures that may be budgeted as staff time or materials and supplies without further distinctions. Schools with developed cultural enrichment programs, but without special funds, must use resources not specifically budgeted for this purpose.

Proportion minority enrollment, principal ethnicity, and Pilot/Basic status of the school each had moderate to substantial associations with the CEA scale, as they had with each other. The moderate positive association ($r = .39$, $\alpha = .03$) between proportion of minority enrollment and the CEA suggested that administrators in schools with higher minority enrollments may have viewed cultural enrichment as a special need of minority students. It may be that minority

principals were even more supportive of this view. Schools with minority principals showed significantly higher CEA scores than schools with Anglo principals (2.2 and 1.6, respectively, $\alpha = .01$). But since seven out of nine minority principals were in schools of from 90 to 100 percent minority enrollment, we would not estimate the independent contributions of principal and student body ethnicity. Minority principals in minority schools may have been responding to the special needs of minority students or they may favor cultural enrichment programs for all types of students.

Pilot schools had significantly greater CEA scores than Basic schools (2.16 and 1.65, respectively, $\alpha = .05$). Since Pilot grants are awarded in districts that tend to have high concentrations of minority students, this association may be in part a consequence of the relationship between minority enrollment and Pilot/Basic status of the school.* However, the relationship of Pilot/Basic status to the CEA was significant even when the effects of minority enrollment were partialed out (partial $r = .34$, $\alpha = .05$). The reason for the association between Pilot status and CEA scores may be found in administrative definitions. ESAA Pilot grants are awarded to minority-impacted schools to overcome the adverse effects of minority isolation. Thus, districts with Pilot grants may have encouraged cultural enrichment activities in response to this ESAA objective, quite apart from the racial/ethnic composition in particular schools. However, we offer the interpretation cautiously, because substantial monies were not budgeted specifically for cultural enrichment programs.

WHAT IS THE RELATIONSHIP BETWEEN SCHOOL EMPHASIS ON CULTURAL ENRICHMENT ACTIVITIES AND TEACHER BEHAVIOR TOWARD MINORITY AND NON-MINORITY STUDENTS?

We were interested in the degree to which schools emphasized cultural enrichment and intergroup relations activities because of the potential impact of such activities on student attitudes and behavior. We were also interested in the potential impact of school policies on teacher behavior. We have already

*The average percent minority enrollment in in-depth schools in Pilot districts is 85 percent; for schools in Basic districts it is 65 percent.

noted that teacher attitudes did not appear to be a determinant of school emphasis on cultural enrichment.

Our data concerning teacher behavior were based on observer tallies on the number of times teachers acted positively toward Anglo and minority students--for example, by praising, by extending privileges, or by being physically affectionate toward students. From these tallies we constructed an index measuring the extent to which teachers distributed their attentions equally without regard to race or ethnicity. We then examined the relationship of the index scores to school emphasis on cultural enrichment activities. We found that in schools placing greater emphasis on cultural enrichment activities, teachers were significantly less likely to favor either minority or non-minority students; where schools placed little emphasis on cultural enrichment activities, one or the other group was more likely to receive positive reinforcement ($r = .44$, $\alpha = .04$).

Results presented so far indicate that school-level practices were related to equality of treatment in the classroom and to each other, which suggests that they may have resulted from school policy decisions concerning EEO. Next we considered the relationship of school and classroom practices to student integration, to student reports of the treatment they receive from teachers, and to school success in raising student achievement.

DO SCHOOL AND TEACHER PRACTICES HAVE AN IMPACT ON STUDENTS?

STUDENT INTEGRATION

One of the most important distinctions made in the literature of intergroup relations is the one between desegregation and integration (Pettigrew, 1971). Desegregated schools are those in which minority and majority students attend the same institution, are in close physical proximity, and yet may maintain social distance from one another. Integrated schools, on the other hand, are those in which students of different racial/ethnic groups interact freely in work and play.

Observations to assess integration in the desegregated schools were conducted at recess and at lunch. The amount of intergroup mixing was reported in terms of one of three options: none, a moderate amount, and a good deal (coded 1, 2, and 3, respectively). These observations (as many as 50 per school) were averaged to create a school-level indicator, the Student Interaction Index. Table VI-4 shows the frequency distribution of these scale scores. A noteworthy finding, evident in the table, was that in-depth desegregated schools were characterized by considerable student intergroup mixing.

Table VI-4. Frequency Distribution of the Student Interaction Index

Category Labels for Individual Observations*	Scale Score	Number of Schools
1 = No intergroup mixing	1.0-1.9	1
2 = A moderate amount of intergroup mixing	2.0-2.4	6
3 = A good deal of intergroup mixing	2.5-3.0	9
	Insufficient data	1
	Total	17

*These labels are to facilitate interpretation only. Since scale scores are means, a given score could represent any one of a number of different combinations of observations.

Nine desegregated schools were in the scale score range of from 2.5 to 3.0. In these schools, at least half of all observations indicated that "a good deal" of intergroup mixing was present.

Improved intergroup relations are, of course, a major goal of school policies directed toward equality of educational opportunity. What is the evidence from the in-depth study that school EEO activities and practices have an impact on

student intergroup relations? One indication of possible impact was the correlation of the CEA with the Student Interaction Index. That correlation was positive, but not significant ($r = .36$, $\alpha = .09$, based on 16 schools with valid data). The greater part of that association was accounted for by the School Assemblies Index and the Reading Materials Index, as is shown in Table VI-5, below. Both of these components of the CEA were significantly related to the Student Interaction Index. A possible difference between those two indicators and the remaining components of the CEA is that textbooks and assemblies have a relatively direct and certain impact on students; exposure is difficult to avoid. On the other hand, the time principals spend in planning EEO programs, school displays, and library materials have a less direct and less certain impact on the student's school experience. The remaining component of the CEA, the Classroom Integration Index, appeared to have a relatively direct impact, and its correlation with the Student Interaction Index was moderate though not significant.

Table VI-5. Correlations of Components of the CEA With the Student Interaction Index

Component	r =	α =
Reading Materials Index	.53	.02
School Assemblies Index	.48	.04
Classroom Integration Index	.35	NS
Principal Time Devoted to EEO	.25	NS
Library Materials Index	.09	NS
School Displays Index	-.05	NS

STUDENT REPORTS OF TREATMENT BY TEACHERS

Student reports of treatment by teachers were of interest as an index of the quality of students' school experience. We were interested in how the school and classroom practices we observed were viewed by students. Therefore, we

looked for associations between school and classroom practices and student reports of treatment by teachers.

Student reports were obtained from a questionnaire developed for the ESAA national evaluation by a panel of experts in the fields of civil rights, minority-group relations, and survey and evaluation research (Coulson, Ozenne, Bradford, Doherty, Hemenway, and Van Gelder, 1976). The resulting School Climate Questionnaire was administered to all students participating in the ESAA national evaluation at the beginning and end of each school year.

A multiple-item scale of student reports of teacher behavior was derived from the School Climate Questionnaire. That scale, the Teacher-Student Interaction Scale, consisted of items that correspond to the observational measures of teacher reinforcement behavior that were used in the in-depth study. Students were asked:

a. How often does the teacher say something nice to you?

b. How often does the teacher call on you in class?

c. Does the teacher give you sufficient time to respond to questions?

d. How often does the teacher extend privileges to you?

e. How much responsibility are you given in the classroom?

School-level gain scores for the 1975-76 school year were calculated by subtracting school mean pretest scores from mean posttest scores. Gain refers to the student perceptions of more favorable treatment at the end of the year than at the beginning. Average gain is an index of the impact of a particular year's school experience on the students in the school. School-level gain scores were calculated separately for minority and Anglo students.

Based on these indicators, there is evidence of two kinds about the connections between school activities and practices and the students' perceptions of the

treatment they receive. First, student gains on the Teacher-Student Interaction Scale were higher for students in schools where observers reported no tendency for teachers to treat one group more favorably than the other, but the relationship was not significant for either Anglo or minority students. Second, school emphasis on equality of educational opportunity as indexed by the CEA was significantly related to minority students' gains on the Teacher-Student Interaction Scale, but not to gains by Anglos ($r = .38$, $\alpha = .03$, and $r = .15$, NS, respectively).

This is evidence that minorities responded favorably to school efforts to provide equality of educational opportunity. Anglos, on the other hand, appeared to be less affected by these efforts.

STUDENT ACHIEVEMENT

A final question concerned the impact of school efforts to provide equality of educational opportunity on school success in raising student achievement. A reason for thinking that there might be a connection between the two is based on the presumed relationship of cultural enrichment to improved self-image and of improved self-image to increased academic accomplishments. Since the average minority student population in in-depth schools was 65 percent, it is of some interest that the association between the CEA and the combined reading and math measure of school success was positive and significant ($r = .36$, $\alpha = .05$). In-depth schools that emphasized equality of educational opportunity were significantly more likely to raise student achievement.

SUMMARY

This chapter began by inquiring about the level of emphasis that schools placed on EEO-related activities and practices, about whether various EEO-related activities were associated with one another, and about factors that might account for the level of emphasis that schools place on EEO.

Schools appeared to vary a good deal in emphasis on EEO. Two schools showed considerable emphasis and about a quarter of the schools showed little or no evidence of EEO-related activities. Schools that emphasized one type of EEO activity tended to emphasize others. We viewed this as evidence that schools had made policy decisions on these matters. Three factors that might influence policy decisions--Pilot/Basic status of the school, percentage of minority students, and principal ethnicity--were significantly related to emphasis on EEO, and to each other.

Next, we considered questions about the potential impact of EEO-related activities on teacher attitudes and behavior. Although school emphasis on EEO was unrelated to teacher attitudes, it was positively related to lack of teacher bias in reinforcing practices.

Finally we considered how school emphasis on EEO and teacher behavior affected students. In schools placing greater emphasis on equality of educational opportunity, students were significantly more likely to interact without regard to race or ethnicity. Minority students were significantly more likely to perceive teachers as treating them favorably. Schools that placed greater emphasis on providing equality of educational opportunity were more successful in raising student achievement.

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CHAPTER VII

SUMMARY AND RECOMMENDATIONS

The 1975-76 ESAA in-depth study attempts to identify school program and contextual characteristics that differentiated between successful and nonsuccessful elementary schools. It is designed to build upon some of the tentative findings of the 1974-75 in-depth study, in which a number of program and contextual components were found related to academic achievement in the ESAA schools. Our search strategy in that earlier study involved the examination of a very large number of variables. Consequently, we were only too aware of the strong probability that some of the findings were artifacts of our methodology, even though the results were interpretable and indeed were supported to some extent by previous research. Therefore, in the present study we narrowed our analytical focus and concentrated upon confirming the results of the previous in-depth study and explicating relationships that were found in both years of the study.

Our decision to slant the 1975-76 study toward hypothesis-testing influenced several aspects of the study: (1) we collected additional data on the construct areas that appeared to predict school success in the earlier study; (2) we generated questions, to be answered through examination of the data, concerning the basic import of the previous study's results; (3) in analyzing the data, we first attempted to duplicate relationships among key variables pinpointed in the prior year, and then examined conceptually related variables to determine how program and contextual components operated to affect student achievement.

Our research strategy had partial success. Some of the findings from the 1974-75 study were confirmed--most notably, the finding concerning the importance of administrative leadership. However, as expected, not all of last year's results were duplicated. Our analysis of the interrelationships of various instructional approaches, while not duplicating last year's results, may shed some light on how certain teacher behaviors affect student achievement.

Because the 1975-76 in-depth study did not have an experimental design, it was not possible to test for the effects of program and contextual variables by random assignment. Our sample size was relatively small; thus, some of the findings from this study, as well as the previous one, could be spurious, resulting from systematic non-program differences in the successful and nonsuccessful schools, or chance associations among the variables that were analyzed.

In the following paragraphs, findings from this year are compared with results of the previous study and with findings from comparable current research.

SUMMARY AND DISCUSSION OF FINDINGS

ORGANIZATIONAL CLIMATE

In Chapter III, we addressed three questions related to how school organization and management differed in in-depth schools that were successful and nonsuccessful in raising student achievement:

- Is administrative leadership in instruction related to gains in student achievement?
- Is the coordination of instructional programs throughout the school related to gains in student achievement?
- Is the setting and maintenance of academic standards related to gains in student achievement?

Leadership in Instruction

We defined administrative leadership in instruction by how strongly principals felt about instruction, by the extent to which they communicated their views on instruction, and by how much responsibility they and other administrators took for instructional policy decisions. Each of these aspects of leadership was significantly related to achievement (both separately and combined), confirming nearly identical findings of the 1974-75 ESAA In-Depth Study (Wellisch,

et al., 1976). Communication of a point of view on instruction through regular review and discussion of teaching performance was found to be especially prevalent in successful schools. In addition, successful school administrators assumed more responsibility for program planning and evaluation, as well as for selection of basic instructional materials (the instructional decision area found relevant in the 1974-75 ESAA In-Depth Study).

Probably because the value of administrative leadership is usually taken for granted, arguments about its relevance to education have (until recently) been largely inferential or speculative. A survey by the state of New York in 1972 identified 37 studies in which school determinants of student achievement were sought (New York, 1972). Among the studies reviewed, none examined school leadership, but several found a positive relationship between principals' and superintendents' salaries and student achievement (Kiesling, a and b). The reviewers inferred that the relevance of salary to achievement must be in "principal-superintendent quality."

More recently, educational researchers have begun to examine the connection between administrative leadership and student achievement gains. In-depth researchers associated with a recent study of compensatory reading programs summarized results that are quite consistent with our own (Trismen, Waller, Wilder, 1975). They reported that unusually effective programs all manifested a commitment to reading, focused carefully on basic skills, were guided by effective leadership, and had a relatively broad array of materials accessible to staff members who shared ideas with one another. Like those in the ESAA In-Depth studies, the schools in this study were specially selected from a large, nationwide sample. Another recent study, investigating reading gains in Los Angeles schools with students of predominantly minority backgrounds, reported that: "Among school-level factors that affect reading achievement, the leadership role of the principal is one of the most important" (Armor, et al., 1976). According to this study, one way in which leadership affected the educational process was through the example set by principals who were themselves hard-working and committed.

Program Coordination

A second major finding of the 1975-76 in-depth study was that achievement gains were larger when instructional programs were extensively coordinated. Ratings of the extent of program coordination were based upon how well the programs' content, sequence of objectives, and use of materials were organized, and on whether programs in one class or grade were planned and executed in relation to programs in other classes and grades.

Other research reporting the relevance of coordinated instructional programs to student achievement includes a two-year study of Michigan schools (Michigan, 1976). The Michigan researchers characterized a group of variables as "degree of program organization," and found it to be associated with higher reading achievement. They also found that principals' satisfaction with coordination between regular and compensatory education teachers was associated with reading achievement. The Michigan study examined school organizational processes in great detail, finding a large number of relationships with achievement. As in the ESAA in-depth study, they found that the frequency of discussions about instruction was related to student achievement gains.

The study of Los Angeles schools, cited above (Armor, et al., 1976), also reports results indicating that program coordination can have an impact on school success. That study found that interaction among teachers concerning teaching problems and practices was positively associated with reading gains.

Academic Standards

The third major finding concerning the organization and management of schools was that administrators' emphasis on academic standards was associated with student achievement. Schools where low-achieving students were required to repeat grades, where principals opposed the postponement of instruction in basic skills, and where teaching performance was regularly reviewed, tended to succeed in raising achievement. These findings were of particular interest

because of the related in-depth study finding that teacher standards were also associated with classroom-level achievement gains. The two findings are not directly comparable, because outcome measures were different in the two analyses. Nevertheless, the consistency of the separate results does raise questions for future investigation about connections between administrator and teacher standards and student achievement gains.

Academic standards have recently received considerable attention in the popular press. For example, The Observer, a national weekly, described how Greensville County Schools in Virginia replaced "social promotions" with "competency promotions," and the apparently dramatic results with respect to student achievement (Greene, November 6, 1976). In two years, the county's sixth-grade students rose from bottom place in academic accomplishment to the average or above for all Virginia students.

Given the common practice in many schools of deferring instruction for "disadvantaged" children and of concentrating instead upon non-academic goals such as improving self-image, it is interesting that principals in the ESAA in-depth successful schools apparently set high standards for low-achieving students by opposing the postponement of basic skills instruction. Other studies, as well as our own, suggest that higher expectations may lead to increased achievement. A study by Rosenthal and Jacobson (1968), though not directly concerned with gains in reading or math, is relevant here. Those authors found that high teacher expectations led to student gains in measured intelligence; the younger the student, the greater the gain. Another study, assessing the impact of educational innovations, reported a related finding concerning timing of instruction (American Institutes for Research, 1976). That study found that more time devoted to basic skill instruction in earlier grades "may significantly improve the chances of some students to demonstrate substantial gains in reading achievement." These gains persisted even after instructional time was reduced.

READING AND MATHEMATICS INSTRUCTIONAL PRACTICES

In Chapter IV, we examined reading and math instructional practices, teacher attitudes, and student task-oriented behavior to identify differences between classrooms where students had high versus low achievement gains. Two major questions were addressed.

- Are structured teaching practices associated with student achievement gains?
- Is student task-oriented behavior related to achievement gains? If so, do structured teaching practices lead to student task-oriented behavior?

Our interest in structure derived from the results of the 1974-75 ESAA in-depth study, which found various structured teaching practices to be related to student achievement gains. Based on the results of that study, we defined structure in terms of use of clearly defined objectives, teacher standards, adequacy of practice, and feedback of results.

Findings this year were broadly consistent with hypotheses suggested by last year's results, in that we did find certain structured teaching practices to be associated with student achievement gains. We found that practice time was significantly related to reading achievement gains, and that the introduction of new material by placing it in the context of previously learned material was significantly related to math gains. Other relationships were more complex, in that they involved interactions between two variables. Students made higher math gains when:

- Teachers praised and rewarded frequently and were more favorable to restricting rewards to occasions when students made academic progress
- Teachers used behavioral objectives and attached importance to setting challenging goals
- Teachers emphasized behavioral objectives and individualized instruction

With regard to our second question, we found that student task-oriented behavior was significantly related to math gains and to the use of structured teaching methods.

Structured Teaching Methods

Our findings on structured teaching relate to issues that have received considerable research attention in recent years. For instance, a substantial amount of research literature suggests that structured teaching may be particularly effective with low-achieving students. A 1971 review summarized the available evidence on this question in the following way: "The tightly structured programmed approach including frequent and immediate feedback to the student combined with a tutorial relationship, individual pacing, and somewhat individualized programming are positively associated with accelerated pupil achievement" (Gordin, 1971, p. 24; emphasis in the original).

Evidence related to our results on practice time and reading achievement gain comes from research on total exposure to reading and math instruction and achievement gain. Several investigations in that tradition have had results consistent with our own (see for example Kidder, 1974; O'Reilly, 1974; Wiley and Harnishfeger, 1974), although the evidence from other studies is sometimes contradictory (Armor, et al., 1976).

Our finding on teacher use of structured lesson introductions closely parallels the findings of three earlier studies of student-teacher interaction. Furst and Amidon (1967), Penny (1969), and Soar (1966) found that student achievement was significantly related to teachers' introductions (to lesson materials) that provided an overview or cognitive framework for what is about to happen or has happened. (See also Ausubel, 1970, for the theoretical background to this type of research.)

Earlier in our comments about principal standards, we briefly noted the literature connecting teacher expectations to student gains. That work is especially relevant to the ESAA in-depth study finding that teacher standards were related

to math achievement gain. Research on teacher expectations, notably beginning with Rosenthal and Jacobson, 1968, found that when teachers were induced to believe that certain students would develop rapidly, they did. Since that study involved manipulation of teacher beliefs, the direction of causality is not intrinsically ambiguous as it is in correlational studies such as our own. From our own data, we cannot determine whether higher standards lead to higher achievement or whether higher achievement leads to higher standards. Our results indicate that both hypotheses are reasonable, though, of course, the former is the more interesting one.

Much of the literature on teacher expectations bears on issues raised by our findings. A study of teacher standards in San Francisco high schools (Fernandez, Espinosa, Dornbusch, 1975) deals directly with the relation of standards to reinforcement and achievement gain (the question addressed in our own research). The San Francisco study (based on student reports) found that Chicano students were making inaccurate appraisals both of their own performance and of their level of effort, and that "their misperceptions were a product of a faulty evaluation system, which substituted praise and warmth for challenging academic standards" (Fernandez, et al., 1975, p. 2). In that study, lower-achieving students were found to be receiving more praise than higher-achieving students.

Structured Teaching, Student Task-Oriented Behavior, and Achievement Gain

Several studies have shown significant relations between teacher and student task-oriented behavior that parallel our own. Smith (1971) recently summarized six studies that found significant relations between teacher task-oriented or "businesslike" behavior and student achievement gains. Smith concludes:

> "Ratings on task orientation may be a significant correlate of student achievement because 'you get what you teach for.' That is, those teachers who focused on the learning of cognitive skills obtained the highest student achievement in this area; those teachers who focused on other activities in the hope that cognitive growth would be obtained indirectly were less successful" (p. 47).

RESOURCE USE AND RESOURCE COSTS

In Chapter V on resource costs, we addressed two questions:

- Does the level of resource use make a difference in academic achievement?
- Does the way resources are used make a difference in academic achievement?

There is substantial research literature on these questions, but with contradictory results.

Level of Resource Use

In this year's in-depth study, we found no relationship between per-pupil cost for reading or math instruction and academic performance. While average per-pupil costs for reading instruction resources were slightly higher in successful schools than in nonsuccessful ones, these differences were not statistically significant. The average resource costs for math instruction were slightly higher in nonsuccessful schools, but again, these differences were not significant.

Paralleling our own results, one recent evaluation of compensatory reading programs found no relationships between level of per-pupil resource cost for reading programs and reading achievement gains (Flynn, Hass, Al-Salam, 1976). The objectives and approach of that evaluation were quite close to those of the ESAA in-depth study. That is, their objective was to assess the relationship between resource costs and achievement performance. And, rather than using expenditure data, that study estimated program costs on the basis of the amount of resources actually used in reading programs. On the basis of several different types of analyses, Flynn, et al., concluded that there was no "clear functional relationship between the cost of resources for compensatory reading programs and student achievement" (Flynn, et al., 1976, p. 105).

The Los Angeles schools study, cited previously, also found no relationship between the amount of time students spend in reading instruction and reading gains (Armor, et al., 1976).

While his approach differed from ours, Tallmadge (1973) found that there was little, if any, relationship between the level of regular and supplemental per-pupil expenditures and academic gains in reading or math. Instead of using classroom-level resource cost data, Tallmadge used budgetary expenditure data differentiated in terms of regular per-pupil expenditures and supplemental per-pupil expenditures. Tallmadge found that within "saturated schools" (i.e., schools having 75 percent of the student body eligible for Title I participation), no relationships were found between regular or supplemental funding and academic gains.

Results contrary to those of the ESAA in-depth study are reported in a recent cost-effectiveness study of a sample of Michigan elementary schools (the 1974-75 Michigan Cost-Effectiveness Study, 1976). The approach taken in the Michigan study parallels, in concept, our resource cost analysis. That is, the Michigan study developed estimates of resource costs by combining hourly allocation data on various instructional resources with average resource prices. The study found that in 1974-75, successful sites had significantly higher total program costs and significantly higher per-pupil costs for classroom reading activities. The Michigan study also examined the relationships between achievement gains and the cost of having classroom teachers participate in planning and decision-making for compensatory reading programs. The researchers found that teachers in the high-achieving sites devoted significantly more time (and hence had higher teacher costs) to curriculum planning and decision-making for compensatory reading than did the low-achieving sites. These results differ from the ESAA in-depth study results, in that we found no consistent relationship between reading gains and teacher participation in reading curriculum development, program planning, and assessment. We did find that teachers in schools ranked nonsuccessful on math devoted significantly more time to participation in math pro-

gram planning and assessment and curriculum development than teachers in schools ranked successful on math.

However, we found in the ESAA in-depth study cost analysis a strong tendency for principals of schools ranked successful on reading and math to have devoted more time to program development and assessment activities within the school than principals in nonsuccessful schools. A similarly strong tendency occurred with regard to principals' participation in inservice training activities. That is, principals of successful schools (in reading or math) consistently spent more time receiving staff development training--in such areas as curriculum development for disadvantaged students, leadership techniques, program planning and evaluation, and school/community relations--than principals of nonsuccessful schools. These results, derived from analysis of resource costs, suggest that successful schools tended to have principals who undertook to develop their professional skills continually and who took an active role in program development and assessment activities. This is quite consistent with our findings, reported in Organizational Climate, and the findings of other studies (Trisman et al., 1975; Armor, et al., 1976) concerning the importance of the principal's leadership role.

Quality of Resource Use

The second major question examined in the ESAA in-depth study resource cost analysis concerned the quality of resource use; that is, does the way resources are used make a difference in achievement? Very little has been done to assess this question, although two recent evaluations (Flynn, et al., 1976; Armor, et al., 1976) have discussed the need, in future compensatory education evaluations, to shift from an exclusive emphasis on the impact of level of resource use to an assessment of the qualitative differences in the way resources are used.

EQUALITY OF EDUCATIONAL OPPORTUNITY

In Chapter VI on equality of educational opportunity (EEO), we examined the extent to which schools emphasized EEO-related activities; how teachers' behavior toward students related to school emphasis on EEO; and how such emphasis varied in relation to minority composition of the staff and student body.

Some ESAA in-depth schools emphasized equality of educational opportunity more than others. These schools used multi-ethnic materials such as school displays, texts, and library books. In addition, these schools were characterized by racially mixed classes, and had special assemblies that featured intergroup themes or minority persons. Teachers' behavior in classrooms was consistent with school policy; that is, in schools emphasizing EEO, teachers praised and rewarded their students without regard to their race or ethnicity. ESAA in-depth schools with minority principals and heavy minority enrollments tended to emphasize EEO most.

In our analysis of EEO, three questions concerning the impact of school and teacher EEO practices on students were addressed:

- Is there an impact on how students of different racial/ethnic groups interact with one another?
- Is there an impact on how students perceive the treatment they receive from teachers?
- Is there an impact on school success in raising student achievement?

The first of these three questions could be asked only in the sample's 17 desegregated schools. The other two were relevant to both Anglo and minority students in schools of any racial composition, although we thought the impact might differ according to a student's race or ethnicity.

The first question relates to an important distinction that has been pointed out in the literature of intergroup relations; the distinction between integration and desegregation (Pettigrew, 1971). The public has also found the distinction important. While the improvement of intergroup relations has been generally considered an important objective, controversy has continued about whether integration as well as desegregation can be achieved through appropriate public school policies and practices. Our first question--do school and teacher practices related to EEO influence how students interact with one another?--bears on this issue.

One of the most important factors thought to affect the development of interracial friendships in desegregated schools is the sanction and support by school authorities. We found that in schools placing greater emphasis on EEO, students were significantly more likely to interact without regard to race or ethnicity during lunch and recess. The first-year ESAA in-depth study (Wellisch, et al., 1976), also observed students during lunch and recess in order to determine how much those of different racial/ethnic backgrounds interacted. That study found a similar relationship between school and classroom practices and student integration. Among other studies confirming the relationship between school practices and student integration is a recent one by Forehand, Ragosta, and Rock (1976). Several of the indicators they used to describe "teaching for effective race relations" are similar to those we used to measure school emphasis on EEO: the use of multiracial curriculum material; the teaching of minority-group history and culture; and ensuring racial mix by assigning students to work together. Using two measures of race relations--students' statements of personal attitudes (desire for friends of a different race, liking for integrated schooling) and students' perceptions of school attitudes (how students thought teachers and principals liked integration)--Forehand and associates conclude: "Schools that teach for effective race relations have good race relations" (p. v).

Our second finding was that minority students were more likely to perceive treatment by teachers as increasingly favorable in schools that emphasized EEO. Numerous studies have examined how desegregation affects students psychologically. While our investigation was concerned with EEO emphasis rather than desegregation, an emphasis on EEO may also have psychological consequences. The general direction of findings concerning students' psychological welfare, according to Nancy St. John (1975), is that desegregation is dysfunctional in some ways for minority youth. However, we must ask, she says, "...in what respects? For what types of students? Under what circumstances?" Our study focused on one potentially relevant circumstance, the extent to which schools emphasize EEO. In that students' perceptions of favorable treatment indicate a psychological benefit, we have found that schools emphasizing EEO are beneficial rather than dysfunctional for minority students. No significant effect on Anglo students was noted.

In a similar fashion, our third question also differs from the one most often addressed in studies of school desegregation and student achievement. Starting with Coleman in 1966, who found that Black children achieved more in desegregated schools, numerous researchers have attempted to determine how desegregation effects student achievement. After reviewing much of their work, Nancy St. John (1975) concludes that the overall lack of clear and consistent findings (with respect to achievement) indicates that how desegregation is implemented may be more important than the fact of desegregation itself. Our question--does school emphasis on equality of educational opportunity affect student achievement?--addresses the issue of implementation by looking at the support provided by schools for minorities and for better intergroup relations. We found that schools that emphasized equality of educational opportunity were significantly more likely to raise student achievement. Forehand and associates, who addressed the same questions (1976), also found that "teaching methods oriented toward good race relations are associated with improved achievement" (p. v).

RECOMMENDATIONS

In concluding this report, we would like to make two kinds of recommendations. One concerns the implementation of findings, and the other concerns future research in this area.

IMPLEMENTATION OF FINDINGS

A large body of research is available, only a fraction of which was cited here, suggesting that principals make a difference in student achievement. The ways in which principals make a difference, as evidenced by the two years of ESAA in-depth study, appear to be:

1. Commitment to basic skills instruction--Such a commitment is demonstrated in our study by teacher performance review, opposition to postponement of basic skills instruction, and requiring non-achieving students to repeat grades.
2. Communication to the teaching staff of the principal's point of view concerning instruction--Mechanisms for communication include faculty meetings and regular review and discussion of teaching performance.
3. Leadership by the principal in instruction-related tasks--Such tasks include selecting basic instructional materials and planning and evaluating instructional programs for the school.

Not only is there empirical evidence demonstrating the principal's importance, but the idea that principals can make a difference, by virtue of the authority vested in their position, is a logically compelling proposition. We believe it is time for a new level of emphasis on recruiting and selecting principals who have both leadership qualities and strong qualifications in basic skills instruction, particularly for schools having a large proportion of underachieving students. For those incumbent principals who are lacking in qualifications, we recommend intensive training programs. Our data indicate that principals

of successful schools had received significantly more training in curriculum development for disadvantaged students, in effective leadership techniques, and in program monitoring and evaluation procedures.

It is here, in emphasizing the importance of training for principals, that Federal programs could play a significant role. We are not suggesting that the emphasis in ESAA and other Federal compensatory programs upon teacher in-service training is necessarily misplaced. Rather, there should be additional strong direction from the U.S. Office of Education concerning the importance of inservice training for principals, the content of such training, and effective training strategies.

FUTURE IN-DEPTH STUDY*

In-depth studies that have attempted to identify the determinants of school success (including our own) share a common failing--they do not have an experimental design. In one sense, of course, this makes parallel findings among the studies noteworthy; as indicated earlier, a few findings, such as the importance of administrative leadership, have been common to a number of studies. However, in many cases some of one study's results are confirmed by a few other studies and not confirmed, or even refuted, by others.

In many ways the methodology for conducting in-depth studies is becoming more rigorous: The double-blind design is frequently used; observers are being trained and tested to increase inter-observer reliability; structured response formats are in more common usage; in some cases, students are being tested before and after treatment; studies attempt to control for non-program factors, primarily student race/ethnicity and student socioeconomic background; and

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*The term in-depth study is used here to distinguish studies that employ techniques of observation and interview from those that use survey methodology. In-depth studies conducted for USOE are sometimes called successful sites, successful strategies, or successful components studies.

relatively sophisticated analytical techniques, such as multiple regression and path analysis, are being used.

Even with improvements in methodology, in-depth studies tend still to be constrained by relatively small samples and, most importantly, by the fact that the research laboratory is the classroom or school, in which literally dozens of influences might be affecting student achievement.

To deal with the plethora of possible causative agents, some researchers attempt to approach their studies with an explicit or implicit model of student achievement. That is, in the a priori belief that primary determinants of student achievement lie in teacher behavior, instructional approaches, peer group influences, etc., they focus their investigation on one of these dimensions. While this most certainly will add more to our knowledge of what works than the buckshot approach, in which dozens of variables are related to outcome measures, it is risky. The probability is strong of producing null, negative, or uninterpretable results, particularly if insufficient contextual data are collected to examine interactional effects. For example, an instructional approach such as individualized treatment, overall, probably is ineffective as often as it is effective. However, for certain kinds of students, individualized treatment that includes: (1) teachers who can diagnose weakness and prescribe appropriate treatment, (2) properly sequenced materials, (3) exposure to treatment for a sufficient period of time, (4) appropriate reinforcement, etc., is very likely to produce consistently measurable effects.

In-depth studies supported by the U.S. Office of Education, in the main, have had two principal objectives: One is to identify program and contextual components that differentially affect student achievement; the other is to describe successful programs so that they can be replicated. Within the time and budget constraints imposed by Federal contracts, these objectives have tended to work at cross purposes. To meet the objective of identifying variables that predict student outcomes, selected program or contextual variables

should be randomly assigned to students and schools. This would provide fairly conclusive evidence of the effectiveness of the variables being tested. If an experimental design is not feasible, focus on a very limited number of naturally occurring program and contextual dimensions could provide strong indications of variable effectiveness. However, to meet the second objective of describing successful programs for the purpose of replication, data must be gathered on all or many of the variables that comprise the program and its environment.

In the interest of efficiently adding to our knowledge of what the schools can do to raise students' achievement level, we suggest that the time has come for a different orientation to USOE's in-depth studies. Up to now, the "buckshot" studies served a purpose--they identified a number of promising leads. It seems advantageous to design future studies to test the hypotheses that have been suggested.

APPENDIX A

STATISTICAL TECHNIQUES

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STATISTICAL TECHNIQUES

The major task to which the use of statistical techniques was applied in this study was that of assessing relationships between various school and classroom factors and student achievement gains. Schools were compared to determine what school and program factors distinguished successful from nonsuccessful schools; similarly, classrooms were compared to determine what teaching practices and classroom conditions could account for students' gains in reading and math achievement. In general, differences are larger or smaller, or occur with varying degrees of regularity. For this reason, differences may be difficult to evaluate intuitively. Statistical techniques permit comparisons to be expressed in a more rigorous and precise way.

Two kinds of statistical statements about the relationships between one condition or event (an independent variable) and another (a dependent variable) may be made. The first is a test of significance, which informs us of the probability of a particular relationship being observed when in fact no such relationship exists (the null hypothesis). Level of significance is expressed by a decimal value; "$\alpha = .01$" means that under the null hypothesis the chance of a relationship as large or larger than the one observed is only one in one hundred. If the probability is small, it is conventional to reject the null hypothesis and conclude that a relationship is probably genuine. The relationship is described as significant. The second statement about a relationship concerns its strength. The strength of a statistical relation is reflected by the extent to which knowing a particular condition (a value of the independent variable) reduces uncertainty about another condition (the value of the dependent variable). Strength of association is expressed by a correlation coefficient, which ranges from -1 to +1, where -1 and +1 indicate no uncertainty and 0 indicates there is complete uncertainty or no association. When an increase in the value of one variable is associated with an increase in that of another, the correlation is positive; when an increase of one is associated with a decrease of the other, the correlation is negative.

The choice of statistical tests was conditioned by a number of factors. The following paragraphs briefly describe the tests used in this study and the conditions that affected their selection. More thorough discussions and the details of computation may be found in the statistical texts listed in the bibliography.

Fisher's Exact was used to test the significance of an association between two dichotomous variables when the number of cases was small. The chapter on organizational climate (Chapter III) contains several examples. Fisher's Exact tests the hypothesis that a particular joint distribution and every other joint distribution showing as much or more evidence of association between the two variables is the result of chance. The cumulative probability of obtaining these distributions by chance is taken as the significance level.

Tau c was used to assess the strength of an association between two ordinal-level variables having discrete values. It uses the information about the ordering of categories of variables by considering every possible pair of cases. An example of the use of Tau c is found in Chapter II, where the association between school selection and outcome rankings is shown.

To compare successful and nonsuccessful schools when the arithmetic means of the two groups were an appropriate measure of a variable of interest, t-tests were used. That is, the use of t-tests assumes interval-level measurement; it also assumes the populations of the groups to be normally distributed and standard deviations to be equal. The relationship of resource use costs to school outcomes was assessed in large part with t-tests (Chapter V). Sample mean scores are compared to determine if the two groups differ significantly. The null hypothesis to be tested is that the population means are the same, as opposed to being different. For many of our variables, the alternative hypothesis was that one of the populations should tend to have a higher mean score than the other, in which case one-tailed tests were appropriate.

Pearson's product-moment correlation coefficient (r) was used to assess the strength of linear relationships between variables. The magnitude of the coefficient reflects the extent to which two variables are related in a linear way. Linearity indicates that an increase or decrease of a specified amount in one variable is associated with an increase or decrease of a specified amount in the other. A value of 0 denotes the absence of a linear relationship. Relationships between teaching practices and mean class gains in reading and math achievement were assessed with Pearson correlation coefficients (Chapter IV). The square of Pearson's correlation coefficients (r^2) is another useful statistic; it measures the proportion of variance in one variable "explained" by the other. Significance levels reported with Pearson's correlation coefficients are estimates based on a statistic known as "Student's t," which assumes the underlying distribution of cases to be normal.

Spearman's rank order correlation coefficient (r_s) was used to measure associations between two variables when the level of measurement was assumed to be ordinal, when there was a large number of values (ranks), and when it was questionable to assume a normal distribution in the populations from which the samples were drawn. Spearman's r was used to assess relationships between a number of independent variables in the analysis of organizational climate (Chapter III). To compute the Spearman coefficient, cases (schools) are first assigned ordinal rankings (lowest through highest) to each variable according to the magnitude of the original scores. The correlation coefficient is then computed treating these ranks as interval values. However, unlike an ordinary correlation coefficient, the rank correlation may tell relatively little about the degree of linear relationship between two variables. Rather, the Spearman rank correlation can be considered as an index of monotonicity of a relationship. Monotonicity refers to the fact that an increase or decrease in one variable is related to an increase or decrease in another, with the size of the increase or decrease not specified. Significance levels reported with these coefficients are computed in the same manner as for Pearson correlation coefficients.

The Mann Whitney U test for randomness of order was used to compare successful and nonsuccessful schools when the level of measurement on a variable on which the two groups were being compared was assumed to be ordinal. The test is regarded as comparable in power to the t-test for equality of means (when assumptions for both tests are met), but has the advantage over the t-test of not requiring the assumption that the populations from which the samples are drawn are normally distributed. The scores of a variable on which the two samples are drawn are assumed to be continuously distributed. The Mann Whitney U test was used in the analysis of organizational climate and school success in raising student achievement (Chapter III). The null hypothesis to be tested is that the two population distributions are the same. For many of our variables, the alternative hypothesis was that one of the populations should tend to have higher average scores than the other, in which case one-tailed tests were appropriate. The first step in the test procedure is to arrange the scores in order (lowest through highest) and to assign ranks to the cases (i.e., schools) in terms of the magnitude of the original scores. The statistic U is then computed, using the sum of the ranks of one of the samples and adjusting for the sizes of both samples. Thus, the value of U depends only on how the cases of the two samples are arranged over the rank order. The procedure for dealing with ties is outlined in many statistics texts. A correction for continuity, as discussed in Snedecor and Cochran (1967), was used with our data.

Partial correlation coefficients were used to assess an association between two variables while adjusting statistically for the effects of one or more additional variables. Relationships between all variables are assumed to be linear. Partial correlation is useful for several analytical purposes. In our analysis of equality of educational opportunity (EEO, Chapter VI), partial correlation was used to test whether a relationship was spurious. (A spurious correlation is defined as one where the correlation between two variables may be accounted for by the fact that a third variable is strongly related to both, which when controlled causes the spurious correlation to vanish or diminish appreciably.) The procedure for calculating partial correlations involves assigning new values

to both the independent and dependent variables by taking the difference between the original value and the value predicted by the control variable (based on simple correlation coefficients). The simple correlation coefficient between these adjusted variables is then computed.

Binomial probabilities were used in the analysis of equality of educational opportunity (EEO, Chapter VI) to assess racial balance in classrooms. Information was collected on the minority/non-minority composition of each classroom. In computing a binomial probability, all possible classroom compositions and the number of ways each can occur, given the grade-level composition, are counted, so that exact probabilities may be calculated for each class. The binomial probability gives the probability that an observed classroom composition could have occurred when the procedure for assigning or selecting students was random. We reported cumulative probabilities, which sum the probabilities for the particular composition observed and for all more extreme compositions possible. No inferences other than that the assignment was non-random (for a particular classroom) are warranted.

APPENDIX B

TABLES FOR ORGANIZATIONAL CLIMATE

Table B-1. Principals' Concern for Instruction

ITEM

"The principal feels strongly about instruction, has definite ideas, and promotes a point of view."

ANALYSIS PROCEDURES:

Responses were scored:

2 = The principal has a distinct point of view and promotes it.

1 = The principal expresses some opinions but does not promote a point of view.

0 = The principal generally allows teachers to develop their own programs.

Teachers' scores at each school were averaged. These averages correlated significantly with principals' scores ($\alpha \leq .01$), and the two scores were summed.

DISTRIBUTION OF COMBINED SCORES

Score	Number of Schools
3.1 to 4	7
2.1 to 3	4
1.1 to 2	3
0 to 1	8
Total =	22

Table B-2. Regular Review and Discussion of Teaching Performance

ITEM

"What techniques are used to inform teachers about their teaching performance?

a. informal verbal commentary
b. regularly scheduled review and discussion
c. informal written evaluations
d. formal written explanations with preestablished criteria
e. video-tape and discussion
f. no evaluation
g. other"

ANALYSIS PROCEDURES:

Responses were scored:

1 = Yes
0 = No

Teachers' responses were averaged at each school. These averages correlated significantly with principals' responses ($\alpha \leq .01$), and the two were summed.

DISTRIBUTION OF COMBINED SCORES:

Score	Number of Schools
0	7
.01 to .50	4
.51 to .99	0
1.00 to 1.50	7
1.51 to 1.99	3
2	1
Total =	22

Table B-3. Discussion of Instructional Methods at Faculty Meetings

ITEM

"At how many faculty meetings are the following issues discussed?

a. educational goals for the school
b. student intergroup relations
c. instructional methods
d. administrative issues
e. parent-community involvement
f. student discipline
g. program planning
h. program evaluation
i. other"

ANALYSIS PROCEDURES

Responses were scored:

3 = all or almost all
2 = about half
1 = about a quarter
0 = almost never

Teachers' scores at each school were averaged. These scores correlated positively but not significantly with principals' scores, and the two were summed.

DISTRIBUTION OF COMBINED SCORES

Score	Number of Schools
4.5 to 6	2
3.1 to 4.4	8
1.6 to 3	9
0 to 1.5	3
Total =	22

RELATIONSHIP TO ACHIEVEMENT

NUMBER OF SCHOOLS		MEAN SCORES (Range = .29 to 4.9)	SIGNIFICANCE
	Reading/Math Combined		
9	Successful	3.4	
13	Nonsuccessful	2.7	NS
	Reading		
7	Successful	3.3	
10	Nonsuccessful	2.7	NS
	Math		
6	Successful	3.1	
8	Nonsuccessful	2.9	NS

SIGNIFICANCE levels were determined with Mann Whitney U tests.

Table B-4. In-School Meetings on Educational Theories and Concepts

ITEM

"How frequently does your school hold in-school meetings on educational theories and concepts (may be associated with faculty meetings)?"

ANALYSIS PROCEDURES:

Responses were scored:

2 = often
1 = sometimes
0 = never

Teachers' scores at each school were averaged. These averages did not correlate with principals' scores, so analysis with achievement gains was performed separately for teachers and principals. No relation of teachers' responses to achievement was found.

RELATIONSHIP TO ACHIEVEMENT (PRINCIPALS' REPORTS)

Achievement

In-School Meetings on Educational Theories and Concepts		Combined Reading/Math N	Combined Reading/Math S		Reading N	Reading S		Math N	Math S	
	Sometimes	10	2	12	8	1	9	6	1	7
	Often	3	7	10	2	6	8	2	5	7
		13	9	22	10	7	17	8	6	14
		$\alpha = .02$			$\alpha = .01$			$\alpha = .05$		

SIGNIFICANCE levels were determined with Fisher's Exact Test.

CODE: N indicates nonsuccessful; S indicates successful.

Table B-5. Teachers' Estimates of Administrative Responsibility for Instruction

ITEMS AND RESPONSE DISTRIBUTIONS

Decision Area	Number of Schools				
	Administrators decide with no input from teachers	Administrators decide after informal suggestions from teachers	Administrators decide after systematically getting input from teachers	Administrators and teachers jointly decide	Teachers decide with no input from administrators
	(5)	(4)	(3)	(2)	(1)
a. Selecting basic instructional material (Range = 2.1 to 3.8)	0	3	13	6	0
b. Planning programs for entire school (Range = 2.4 - 4.0)	0	7	13	2	0
c. Evaluating school programs (Range = 2.2 - 4.3)	2	9	9	2	0

ANALYSIS PROCEDURES:

Teachers' averages were assigned to the five options as follows:

	(5)	= 4.2 to 5.0
MORE ADMINISTRATIVE RESPONSIBILITY	(4)	= 3.4 to 4.1
	(3)	= 2.6 to 3.3
LESS ADMINISTRATIVE RESPONSIBILITY	(2)	= 1.8 to 2.5
	(1)	= 1.0 to 1.7

INTER-AREA CORRELATIONS (r_s)

	a.	b.
b.	.10	
c.	.22	.59

Table B-6. Number of Decision Areas Concerning Instruction in Which Teachers Estimate Administrators Assume More Responsibility

ITEMS AND SCORING

Teachers' estimates of administrative responsibility for:

a. selecting basic instructional materials

1 = More = median score and above (3 to 5)
0 = Less = below median score (1 to 2.9)

b. planning programs for the entire school

1 = More = median score and above (3.1 to 5)
0 = Less = below median score (1 to 3)

c. evaluating school programs

1 = More = above median score (3.34 to 5)
0 = Less = below median score (1 to 3.33)

ANALYSIS PROCEDURES

Inter-area associations are shown in Table A-5.

A count of the number of decision areas for which teachers estimated that administrators assumed more responsibility was obtained by summing the above scores.

DISTRIBUTION OF SCORES

Number of Decision Areas	Number of Schools
3	6
2	5
1	7
0	4
Total =	22

CROSSTABULATION OF NUMBER OF DECISION AREAS WITH ACHIEVEMENT

		Achievement: Combined Reading/Math			Achievement: Reading			Achievement: Math		
		N	S		N	S		N	S	
Number of Areas	0-1	9	2	11	6	2	8	7	0	7
	2-3	4	7	11	4	5	9	1	6	7
		13	9	22	10	7	17	8	6	14
		$\alpha < .04$			NS			$\alpha < .01$		

SIGNIFICANCE levels were determined with Fisher's Exact Test.
CODE: S indicates successful; N indicates nonsuccessful.

Table B-7. Student Achievement and Three Aspects of Administrative Leadership; Reading and Math Criteria

ASPECT OF LEADERSHIP	READING ACHIEVEMENT MEAN SCORES		SIGNIFICANCE	MATH ACHIEVEMENT MEAN SCORES		SIGNIFICANCE
	Successful N = 7	Nonsuccessful N = 10		Successful N = 6	Nonsuccessful N = 8	
1. Administrative concern for instruction	2.6	1.5	.04	2.8	2.0	NS
2. Communication of views on instruction by regular review and discussion of teaching	1.2	.5	.003	1.7	.6	.004
3. Responsibility for decisions concerning program planning	3.3	3.0	NS	3.4	2.9	.02

SIGNIFICANCE levels were determined with one-tailed Mann Whitney U tests, which assign ranks to each school according to the magnitude of the original scores.

SCORING 1. Scores have a possible range of 0 to 4; 0 indicates a unanimous opinion that the principal was little concerned; 4 indicates a unanimous opinion that the principal felt strongly.

2. Scores have a possible range of 0 to 2; 0 indicates that reports were unanimously negative; 2 indicates that they were unanimously positive.

3. Scores have a possible range of 1 to 5, indicating least through most administrative responsibility, respectively.

Table B-8. Comparison of Indicators Used in Administrative Leadership Indices in 1974-75 and in 1975-76 ESAA In-Depth Studies

DIMENSION I: Principals are concerned about instruction.

1974-75: the rank principals assigned to decisions concerning the selection of basic instructional materials among seven policy decision areas

1975-76: combined teachers' and principal's assessment of how strongly the principal feels about instruction

The 1975-76 study found nc relationship between achievement and the rank assigned by principals to policy decisions concerning the selection of basic instructional materials; nor to policy decisions concerning other areas related to instruction (which were additions to the 1975-76 study); nor to policy decisions concerning areas unrelated to instruction.

The 1975-76 indicator, combined teachers' and principal's assessment of how strongly the principal feels about instruction, was added to our in-depth instruments after the 1974-75 study.

DIMENSION II: Principals communicate about instruction.

1974-75: teachers' perception of the principal's point of view on five specific teaching practices

1975-76: whether the principal regularly reviews and discusses teaching performance with teachers

Teachers' perceptions of the principal's point of view on the five specific teaching practices varied insufficiently in the 1975-76 in-depth study schools to permit meaningful analysis with respect to achievement.

The 1975-76 indicator, regular review and discussion of teaching performance, was added to the in-depth instruments after the 1974-75 study.

DIMENSION III: Administrators are responsible for instruction.

1974-75: teachers' estimates of administrative responsibility for selection of basic instructional materials

1975-76: index combining teachers' estimates of administrative responsibility in three areas concerning instruction: selection of basic instructional materials, program planning for the entire school, and program evaluation

The 1975-76 in-depth analysis of administrative responsibility for instruction uses the same data source as the 1974-75 analysis, but includes areas concerning instruction that were added to the second-year study.

Table B-9. Schoolwide Coordination of Instructional Programs

ITEM

"To what extent is the school's instructional program coordinated schoolwide?"

ANALYSIS PROCEDURES

Responses were scored:

2 = to a large extent, both in many aspects (content, sequence of objectives, materials) and throughout all grades

1 = to some extent

0 = very little; each teacher generally plans an instructional program for that teacher's class

Teachers' scores at each school were averaged. They correlated positively though not significantly with principals' scores. Sums of the two scores are distributed as follows:

DISTRIBUTION OF SCORES:

	Scores	Number of Schools
TO A LARGE EXTENT	4	3
:	3 to 3.9	9
:	2 to 2.9	8
:	1 to 1.9	1
VERY LITTLE	0 to .9	0
	Missing	1
		Total = 22

STUDENT ACHIEVEMENT AND COORDINATION OF INSTRUCTIONAL PROGRAMS

NUMBER OF SCHOOLS		MEAN SCORES (Range = 1.29 to 4)	SIGNIFICANCE
	Combined Reading/Math		
8	Successful	3.5	
13	Nonsuccessful	2.8	.01
1	Missing		
	Reading		
6	Successful	3.5	
10	Nonsuccessful	2.7	.04
1	Missing		
	Math		
6	Successful	3.5	
8	Nonsuccessful	2.9	.03

SIGNIFICANCE levels were determined using one-tailed Mann Whitney U tests.

Table B-10. Academic Standards

ITEMS AND COUNT SCORING	NUMBER OF SCHOOLS
1. What percent of your students in grades 3, 4, and 5 are repeating the grade they were in last year? (principal questionnaire)	
0 = no percentage reported for any grade	13
1 = a percentage reported for at least one grade	9
2. Was teaching performance regularly reviewed and discussed? (teacher and principal interviews)	
0 = item score, 0 to .50	11
1 = item score, 1 to 2 (see Table B-2)	11
3. Should basic skills be set aside with many low-achieving students until they are ready to learn? (principal interview)	
0 = yes	15
1 = no	7

RELATIONSHIPS WITH ACHIEVEMENT

		Achievement					
		Combined Reading/Math		Reading		Math	
		N	S	N	S	N	S
Promotion Practices	0	10	3	7	3	6	2
	1	3	6	3	4	2	4
		$\alpha < .05$		NS		NS	
Review of Teaching Performance	0	10	1	7	1	5	0
	1	3	8	3	6	3	6
		$\alpha < .004$		$\alpha < .04$		$\alpha < .03$	
Basic Skills Should Be Set Aside	0	10	5	9	4	5	3
	1	3	4	1	3	3	3
		NS		NS		NS	

SIGNIFICANCE levels were determined with Fisher's Exact test.
CODE: S indicates successful; N indicates nonsuccessful.

APPENDIX C

READING AND MATH PROGRAM CHARACTERISTICS

Table C-1. Class-Level Math Gain Broken Down by Teacher Standards for Use of Reinforcers and Use of Positive Reinforcement

TEACHER STANDARDS FOR USE OF REINFORCERS	USE OF POSITIVE REINFORCEMENT: Low	Medium	High
No Importance	-.11 (3)*	.03 (13)	-.12 (12)
More Importance	-.07 (7)	.02 (9)	.35 (9)
Most Importance	-.06 (17)	-.12 (14)	.23 (11)

*Number of classrooms

USE OF POSITIVE REINFORCEMENT The number of positive and negative ways teachers dealt with their students was tallied by observers during three five-minute periods on each of two days. Index scores for teachers' use of positive reinforcement were obtained by taking the proportions of positive to total interactions tallied. The distribution of index scores was: was:

	SCORE	NUMBER OF CLASSROOMS
Low	.00 to .59	27
Medium	.60 to .82	36
High	.83 to 1.00	32
		95

TEACHERS' STANDARDS FOR REINFORCEMENT USE Teachers rated the importance of using rewards only for academic progress on a scale of 1 to 5, not important through very important (self-administered questionnaires). The distribution of scores was divided into approximately equal groupings.

	SCORE	NUMBER OF TEACHERS
No Importance	1	28
More Importance	2	25
Most Importance	3,4,5	42
		95

(Continued on next page)

Table C-1. Class-Level Math Gain Broken Down by Teacher Standards for Use of Reinforcers and Use of Positive Reinforcement (continued)

ACHIEVEMENT GAIN AND COMBINED EFFECTS The two cells in heavy outline represent classrooms where teachers held higher standards for the use of reinforcement and were observed to use greater amounts of positive reinforcement. The table shows that students in these classrooms had higher achievement gains. We created a dichotomous variable to represent the effects of the combination of these teaching practices. Classrooms indicated in the outlined cells were coded 1; all other classrooms were coded 0. To evaluate the effects of the combination of practices we used step-wise multiple regression. First, the additive effects of reinforcement use and teacher standards were evaluated by regressing the unrecoded versions of these variables on math gain; next we added the dichotomous variable representing the combination of the two variables. The variance explained by the additive effects of the two variables (2%) was not significant. The increment to the variance explained by the addition of the variable representing the combination (8%) was significant at the .01 level.

Table C-2. Class-Level Math Gain Broken Down by Importance of Setting Challenging Goals and Use of Behavioral Objectives

SETTING CHALLENGING GOALS	USE OF BEHAVIORAL OBJECTIVES: Less Importance	More Importance	Most Importance
Less Importance	-.10 (9)*	-.20 (6)	.07 (10)
More Importance	.04 (8)	-.08 (13)	-.14 (11)
Most Importance	-.22 (13)	.11 (13)	.25 (15)

*Number of classrooms

USE OF BEHAVIORAL OBJECTIVES Teachers rated the importance of behavioral objectives in their lesson plans on a scale of 1 to 5, not important through very important (self-administered questionnaires). The distribution of their average scores in three areas was divided into approximately equal groupings.

	SCORE	NUMBER OF TEACHERS
Less Importance	1.00 to 4.33	30
More Importance	4.34 to 4.67	32
Most Importance	4.68 to 5.00	36
		98

SETTING CHALLENGING GOALS Teachers rated the importance of finding ways to challenge (educationally disadvantaged) students, even at the risk of setting goals the student cannot meet at present, on a scale of 1 to 5, not important through very important (self-administered questionnaires). The distribution of scores was divided into approximately equal groupings.

	SCORE	NUMBER OF TEACHERS
Less Importance	3,2,1	25
More Importance	4	32
Most Importance	5	41
		98

(Continued on next page)

Table C-2. Class-Level Math Gain Broken Down by Importance of Setting Challenging Goals and Use of Behavioral Objectives (continued)

ACHIEVEMENT AND COMBINED EFFECTS The cell in heavy outline represents the classrooms where teachers reported greater emphasis on behavioral objectives and attached most importance to setting challenging goals. The table shows that students in these classrooms had higher achievement gains. We created a dichotomous variable to represent the combined effects of these teacher values. Classrooms in the outlined cell were coded 1; all other classrooms were coded 0. To evaluate the effects of the combination of practices, we used step-wise multiple regression. First, the additive effects of behavioral objectives use and challenging goals were evaluated by regressing the unrecoded versions of these variables on math gain; next, we added the dichotomous variable representing the combination of the two variables. The variance explained by the additive effects of the two variables (less than 1%) was not significant. The increment to the variance explained by the addition of the dichotomous variable representing the combination (5%) was significant at the .03 level.

Table C-3. Class-Level Math Gain Broken Down by Individualization and Use of Behavioral Objectives

INDIVIDUALIZATION	USE OF BEHAVIORAL OBJECTIVES: Low	Medium	High
No Individualization	-.12 (10)*	-.04 (21)	-.06 (20)
Some Individualization	-.11 (20)	-.06 (8)	.26 (15)

*Number of classrooms

USE OF BEHAVIORAL OBJECTIVES Teachers rated the importance of behavioral objectives in their lesson plans on a scale of 1 to 5, not important through very important (self-administered questionnaires). The distribution of their average scores in three areas was divided into approximately equal groupings.

	SCORE	NUMBER OF TEACHERS
Less Importance	1.00 to 4.33	30
More Importance	4.34 to 4.67	29
Most Importance	4.68 to 5.00	35
		94

INDIVIDUALIZATION Observers rated individualization in terms of three assessments (objectives, materials, and pacing of instruction) on a scale of 1 to 4, no individualization through a great deal of individualization. In over half the classes, no individualization of any kind was observed. Consequently, we broke our sample into two groups.

AMOUNT OF INDIVIDUALIZATION	NUMBER OF CLASSES
None	51
Some	43

ACHIEVEMENT AND COMBINED EFFECTS The cell in heavy outline represents classrooms where teachers reported greater emphasis on behavioral objectives and where there was some individualized instruction in math. We created a dichotomous variable to represent the combined effects of these two practices. Classrooms in the outlined cell were coded 1; all other classrooms were coded 0. To evaluate the effects of the combination of practices, we used step-wise multiple regression. First, the additive effects of use of behavioral objectives and individualization were evaluated by regressing the unrecoded values of these variables on math gain; next, we added the dichotomous variable representing the combination of the two variables. The variance explained by the additive effects of the two variables (2%) was not significant. The increment to the variance explained by the variable representing the combination (6%) was significant at the .04 level.

Table C-4. Student Task-Oriented Behavior

ITEMS

(1) Observers rated how well students understood tasks assigned by the teacher.

1 = Most students ask questions and need clarification about tasks.

2 = Some students need further clarification.

3 = Most students engage in task without need for many examples, questions, or further elaborations.

(2) Observers rated the smoothness of transitions between classroom activities.

1 = Many students "goof off" as they go from activity to activity.

2 = Some students go to new tasks in an orderly, comfortable fashion. Some students need reminders.

3 = All or most students move from task to task in an orderly and controlled fashion, with little need for direction.

(3) Observers rated the amount of non-task interaction among students.

1 = much

2 = some

3 = little

4 = none

(Continued on next page)

Table C-4. Student Task-Oriented Behavior (continued)

(4) Observers rated the relative proportion of students involved in task- vs. non-task-related activities.

1 = Very few or no task-oriented activities

2 = About one-fourth task-oriented

3 = About half task-oriented

4 = About three-fourths task-oriented

5 = All or almost all task-oriented

ALALYSIS PROCEDURES

Scale scores are the means of the standard scores for the four items. Low scores indicate low task-orientation.

DISTRIBUTION OF SCORES

Score	Number of Classrooms
-2.5 to -2.1	2
-2.0 to -1.6	2
-1.5 to -1.1	5
-1.0 to -0.6	11
-0.5 to -0.1	16
0.0	5
0.1 to 0.5	21
0.6 to 1.0	33
1.1 to 1.5	2
	97

Table C-5. Teacher Use of Harsh Criticism

ITEMS

(1) Observers rated how frequently teachers used harsh criticism or ridicule when students gave inadequate responses.

1 = never

2 = rarely

3 = sometimes

4 = frequently

(2) Observers recorded the number of times teachers "lectured" (i.e., scolded) the class or student as a control technique, from 0 to more than 6 times.

(3) Observers recorded the number of times teachers yelled or shouted at students, from 0 to more than 6 times.

ANALYSIS PROCEDURES

Scale scores are the means of the standardized scores on the 3 items. Low scores indicate little or no use of harsh criticism.

DISTRIBUTION OF SCORES

Score	Number of Classrooms
-1.0 to -0.6	35
-0.5 to -0.1	25
0.0	5
0.1 to 0.5	14
0.6 to 1.0	6
1.1 to 1.5	8
1.6 to 2.0	0
2.1 to 2.5	3
2.6 to 3.0	1
	97

Table C-6. Teacher Monitoring of Students

ITEM

Observers rated how well the teacher monitored students during lesson periods.

1 = The teacher seemed to monitor very few or no students.

2 = The teacher seemed to monitor only some of the students.

3 = The teacher seemed to monitor almost all students.

DISTRIBUTION OF SCORES

Score	Number of Classrooms
1	36
2	38
3	23
	97

Table C-7. Teacher Task-Oriented Behavior

ITEM

Observers rated how task-oriented the teacher was.

1 = The teacher usually abandoned the task when diverted.

2 = The teacher usually stayed with the task, but occasionally abandoned it when diverted.

3 = The teacher almost always stayed with the task, and returned to it when diverted.

DISTRIBUTION OF SCORES

Score	Number of Classrooms
1	1
2	24
3	72
	97

APPENDIX D

RESOURCE ALLOCATION AND COST METHODOLOGY

APPENDIX D

RESOURCE ALLOCATION AND COST METHODOLOGY

One of the questions to be answered by the in-depth study resource cost analysis was whether or not the level of resource use makes a difference in academic achievement. Since this question was assessed by converting quantitative resource use information into program resource costs, special procedures were applied in deriving the resource cost estimates. This appendix describes those special procedures.

Two very different approaches can be used when examining the relationship between resource use and academic gains. One approach is based on school-district budget or expenditure data, collected from district accounting records and year-end financial reports to the state and federal governments. Although these data can reflect actual expenditures made for resources used in a school, they do not permit a more detailed analysis of how specific resources are used within the classroom, or the proportionate use of particular resources for various instructional components within the school.

An additional problem in using budgetary data to assess the type and quantity of resource use is that such data reflect only recently purchased instructional resources. Many instructional resources are inherited from previous programs or years of operation. Using budgetary data prohibits the identification of these inherited resources, and thus prevents analysis of the resources that are actually used within a school or program.*

A more appropriate strategy for assessing resource use is based on class-level information. Instead of focusing on school-level expenditure data, this approach

*For an excellent discussion of the measurement and analytic problems in looking at the impact of resources on student achievement, see Spady (1973).

focuses on the types and quantities of resources actually used by teachers who provide reading and math services to the sample students.

The major advantage of this approach is that it permits a careful assessment of the resources actually used for a subgroup of students (in this case, students in the observed classes) within a school, as well as the determination of the level of use of each type of resource within each class. For this reason, the class-level approach was adopted for the in-depth analysis of school resources.

The instructional resources of primary concern in this study include those that bear on the development, provision, and evaluation of reading and math instruction, including:

a. Teaching Staff--classroom teachers, reading specialists, math specialists, instructional aides, and media specialists

b. Support Staff--speech therapists and principals

c. Equipment--tape recorders, record players, projectors, teaching machines, controlled readers, and System 80

d. Staff development--inservice training for teachers and school principals

e. Program Development and Evaluation--teacher and principal participation in reading and math program development and evaluation

Data on the above resources were collected from the teacher and principal self-administered questionnaires and through classroom observation. Teachers were asked how much time they used special instructional equipment during reading and math, and how much time they devoted to reading and math instruction in the observed classes. Similarly, estimates were obtained regarding the amount of time support staff assisted teachers and students in the observed classes.

School principals and teachers were asked how much time they participated in staff inservice training and how much time they devoted to program development and program evaluation during the year. In each case, data on classroom resources were aggregated to the school level in order to compare successful schools with less successful schools.

To control for variations resulting from cost-of-living differences among districts, standardized prices were used for each type of resource included in the in-depth analysis. (Standardized prices are averages, calculated from a range of prices for each type of resource.) The procedures used to determine standardized prices for staff and non-staff resources varied somewhat. For classroom teachers and other staff, a standardized (average) hourly salary scale was constructed from salary information collected from each district participating in the in-depth study. Table D-1 lists the standardized hourly rates used to calculate the staff costs associated with the development, provision, and evaluation of reading and math instruction.

Table D-1. Average Hourly Salary Schedule for Elementary School Staff Used in the In-Depth Study (Includes Fringe Benefit Factor of 15 Percent)

Staff Type	Average Hourly Salary Rate
Principal	$15.37
Classroom Teacher	9.41
Math Specialist	9.79
Reading Specialist	10.25
Instructional Aide	5.27
School Counselor	11.42
Speech Therapist	10.12
Media Specialist	12.12

In constructing these average hourly salary rates, no attempt was made to develop rates that differentiated staff on the basis of previous experience or level of formal training; it was considered desirable to ensure that any successful-nonsuccessful differences in resource use reported here should not be compounded by such differences in salary rates.

Each classroom teacher's cost for teaching reading or math was calculated by first determining how many hours each week were devoted to reading or math instruction. Using this information, along with the number of days the school was in session during the year, we calculated the total annual hours of reading or math instruction a teacher provided in the observed class. Using this product and the classroom teacher's average hourly salary rate, we calculated the total annual average cost for the provision of reading or math instruction by the teacher. The school's overall classroom teacher cost for providing reading and math to sample students was calculated by summing all teacher costs for reading and math. The same procedure was followed in estimating other staff costs associated with the development, provision, and evaluation of reading and math instruction in the school.

Instructional equipment costs were calculated in a somewhat different way. The cost for each type of equipment includes an estimate of the average annualized capital cost of the item, as well as an estimate of the average annual maintenance cost associated with the use of the item in the classroom. Using the life expectancy for each type of equipment--which ranged from 5 to 10 years--the average annualized capital cost was calculated by dividing the total capital cost per unit by the life expectancy.* The average annual maintenance costs

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*For each type of equipment, an average price per unit was used instead of the actual price. This was necessary because information was not collected on specific brands and models in the schools. The list of standardized (average) prices is based on RMC's 1973 list of educational equipment adjusted for an annual rate of inflation of 7.5 percent (Dienemann, Flynn, and Al-Salam, 1974).

associated with using each type of equipment was calculated by using a standardized factor. Haggart (1971) has proposed using a standardized factor of 15 percent of the total cost of a piece of equipment. However, due to recent inflation, a factor of 20 percent of the average cost for each unit of equipment was used. Table D-2 presents the standardized prices for each type of equipment included in this analysis. Equipment costs were determined by multiplying the amount of time each teacher used a particular type of equipment by the average annual operation and maintenance cost figures. These cost figures were summed to the school level to obtain an estimate of equipment costs for teaching reading and math in each school.

A general estimate of reading and math inservice costs for classroom teachers and principals was calculated by multiplying each teacher's and principal's hourly rate by the total hours of training received during the past year. Districts vary in terms of their policies for compensating teachers and principals for inservice training. Some districts compensate their staff directly for participation or allow them to participate on released time; other districts expect teachers to participate in inservice training on their own time. The purpose in using an hourly rate to estimate inservice training costs was to obtain a consistent cost metric on which schools could be compared. The same procedure was followed in calculating teacher and principal cost for participating in program development and evaluation.

An additional problem with the inservice training cost estimates is that they reflect teacher or principal costs for attending, and thus do not include the planning and implementation costs associated with the training programs. Information on these latter costs was not available for analysis.

Along with quantitative resource data, the procedures outlined above were used to develop a set of comparable program cost estimates for each elementary school participating in the ESAA in-depth study.

Table D-2. Standardized Unit Equipment Costs Used in the In-Depth Study

Equipment Type	Average Cost Per Unit	Life Expectancy (in Years)	Average Annualized Capital Cost Per Unit	Average Annual Maintenance Cost	Average Annual C & M Cost
Tape Recorder	$117.77	5	$23.55	$ 23.55	$ 47.10
Record Player	85.72	5	17.14	17.14	34.28
Movie Projector	604.29	10	60.43	120.86	181.29
Slide Projector	137.29	10	13.73	27.46	41.19
Opaque Projector	348.92	10	34.89	69.78	104.67
Overhead Projector	138.30	10	13.83	27.66	41.49
Television	257.41	10	25.74	51.48	77.22
Filmstrip	106.53	10	10.65	21.31	31.96
System 80	254.23	5	50.85	50.85	101.70
Controlled Reader	313.18	10	31.32	62.64	93.96
Language Master	333.30	10	33.33	66.66	99.99

APPENDIX E

TABLES FOR EQUALITY OF EDUCATIONAL OPPORTUNITY

Table E-1. Time Devoted by Principals to EEO-Related Activities

ITEMS

1. "How much time do you expect to spend during this school year participating in the actual development of new curriculum in your school in... Cultural Enrichment/Intergroup Relations?"

2. "How much time do you expect to devote to needs assessment, program planning, and program evaluation...during this school year (for) Cultural Enrichment/Intergroup Relations?"

ANALYSIS PROCEDURES

Responses to both items were summed.

DISTRIBUTION OF COMBINED RESPONSES

Number of Hours	Number of Schools
0	4
1 to 10	7
11 to 20	6
21 to 40	5
Over 40	3
Missing Data	1
	Total = 26

Table E-2. Minorities in School Displays

ITEMS AND SCORING

"In terms of people and situations, how are minority people depicted?" (in school displays)

1 = No minorities are shown.

Character Centrality

2 = Minorities are shown but not as central characters as often as Anglos.

3 = Minorities are shown as central characters as often as Anglos.

Status

2 = Minorities are shown but not in high-status positions as often as Anglos.

3 = Minorities are shown in high-status positions as often as Anglos.

Action Context

2 = People of different ethnic groups are shown but not in the same action setting.

3 = People of different ethnic groups are shown in the same action setting.

ANALYSIS PROCEDURES

Schools with no minorities in displays were scored 1. Scores on the three types of assessments were averaged in schools with minorities in school displays.

DISTRIBUTION OF COMBINED SCORES

Score	Number of Schools
1.00	8
2.01 to 2.50	10
2.51 to 3.00	8
	Total = 26

Table E-3. Minorities in Textbooks and Supplemental Reading Materials

ITEMS AND SCORING

"In terms of people and situations, how are minority people depicted in reading texts and supplemental reading materials?"

Character Centrality

0 = Minority persons are not shown as central characters as often as Anglos.

1 = Minority persons are shown as central characters as often as Anglos.

Status

0 = Minority persons are not shown in high-status positions as often as Anglos.

1 = Minority persons are shown in high-status positions as often as Anglos.

ANALYSIS PROCEDURES

Classroom scores for each of the two items were averaged to create a school-level index. An index score of 1 would mean that all materials examined showed minorities favorably.

DISTRIBUTION OF COMBINED SCORES

Score	Number of Schools
.10 to .19	2
.20 to .29	6
.30 to .39	4
.40 to .49	6
.50 to .59	2
.60 to .69	3
.70 to .79	2
.80 to .89	0
.90 to 1.00	0
Missing Data	1
	Total = 26

Table E-4. School Assemblies with Cultural Enrichment/Intergroup Relations Themes

ITEMS

"How many assemblies included minority or ethnic subject matter as a major focus?"

"How many assemblies had intergroup relations as a major focus?"

ANALYSIS PROCEDURES

Responses to the two items were summed.

DISTRIBUTION OF COMBINED RESPONSES

Number of Assemblies	Number of Schools
0	17
1-4	4
5-6	4
20	1
	Total = 26

Table E-5. Library Material on Cultural Enrichment/Intergroup Relations

ITEM AND ANALYSIS PROCEDURES

Observers tallied the number of card catalogue listings under each of the following headings (and variants):

- Africa
- American Indians
- Asia
- Black
- Chicano
- Desegregation
- Discrimination
- Ethnic Studies
- Indians
- Intercultural Education
- Integration
- Intergroup Relations
- Latin America
- Mexico
- Minorities
- Native American
- Negro
- Prejudice
- Race
- Race Problems
- Race Relations
- Segregation
- Slavery

DISTRIBUTION OF NUMBER OF LISTINGS

Number of Listings	Number of Schools
0	3
1 to 50	2
51 to 100	5
101 to 150	7
151 to 200	4
201 to 250	1
251 to 300	1
301 to 350	1
Missing Data	2
	Total = 26

Table E-6. Racial/Ethnic Balance of Classrooms

ANALYSIS PROCEDURES

The ethnic composition in each classroom was compared to the grade-level ethnic composition to determine whether the classroom proportions of Anglo and Minority students differed from the grade-level proportions. When the classroom composition deviated from grade-level ethnic composition, we estimated the probability of obtaining a deviation as large as or larger than that observed, given random classroom assignment. Exact cumulative binomial probabilities were used to estimate these values.

Estimated classroom probabilities were averaged to create a school-level indicator. Schools with fewer than three classrooms with valid data were excluded from the analysis. Higher values indicate that the average classroom ethnic mix is more nearly equal to the grade-level ethnic mix.**

DISTRIBUTION OF SCORES

Score	Number of Schools
0 to .20	1
.21 to .40	4
.41 to .60	5
.61 to .80	4
.81 to 1.00	0
Segregated Schools	9
Insufficient Data	3
	Total = 26

**Though these scores are based on individual classroom probabilities, the school-level average score has no simple probabilistic interpretation.

Table E-7. Index of Teacher Bias in Use of Praise and Other Rewards

ANALYSIS PROCEDURES

In those classrooms where fewer than 90 percent of the students were of a single racial/ethnic group, observers tallied the number of times a teacher directed praise and other rewards to minorities and Anglo students. The probability of receiving a reward for students of each ethnic group was calculated as the number of times a teacher rewarded members of the group, divided by the number of students in that group. For each class the values obtained were compared to determine whether either group received a larger than proportionate share of reinforcement. When Anglos received more than their share of reinforcement, the classroom was scored 1; classrooms where both groups received equal proportions of reinforcement were scored 0; classrooms where minorities received greater proportions were scored -1. These classroom values were averaged to create a school-level indicator ranging from -1 to +1. The absolute value of this index was taken as an indication of overal bias in the school. A score of 0 indicates no bias; a score of 1 indicates that all teachers observed were systematically biased toward a particular ethnic group.

DISTRIBUTION OF SCORES

Score	Number of Schools
0.00 to .10	0
.11 to .20	4
.21 to .30	2
.31 to .40	4
.41 to .50	1
.51 to .60	0
.61 to .70	3
.71 to .80	0
.81 to .90	0
.91 to 1.00	2
Segregated Schools	9
Missing Data	1
	Total = 26

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